THE Journal OF THE
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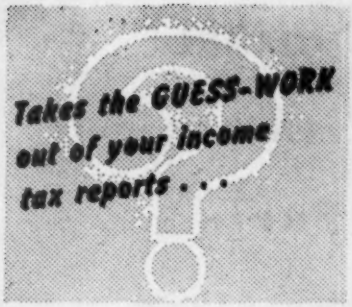

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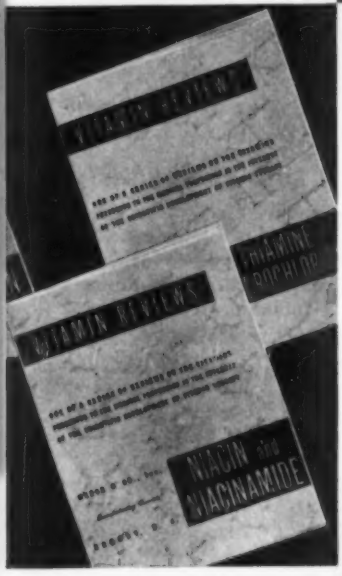

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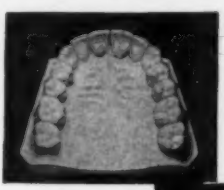

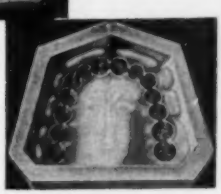

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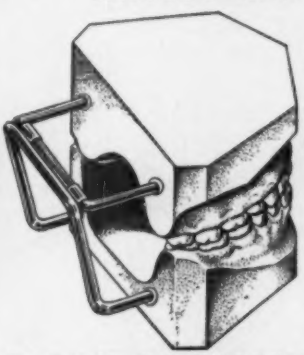

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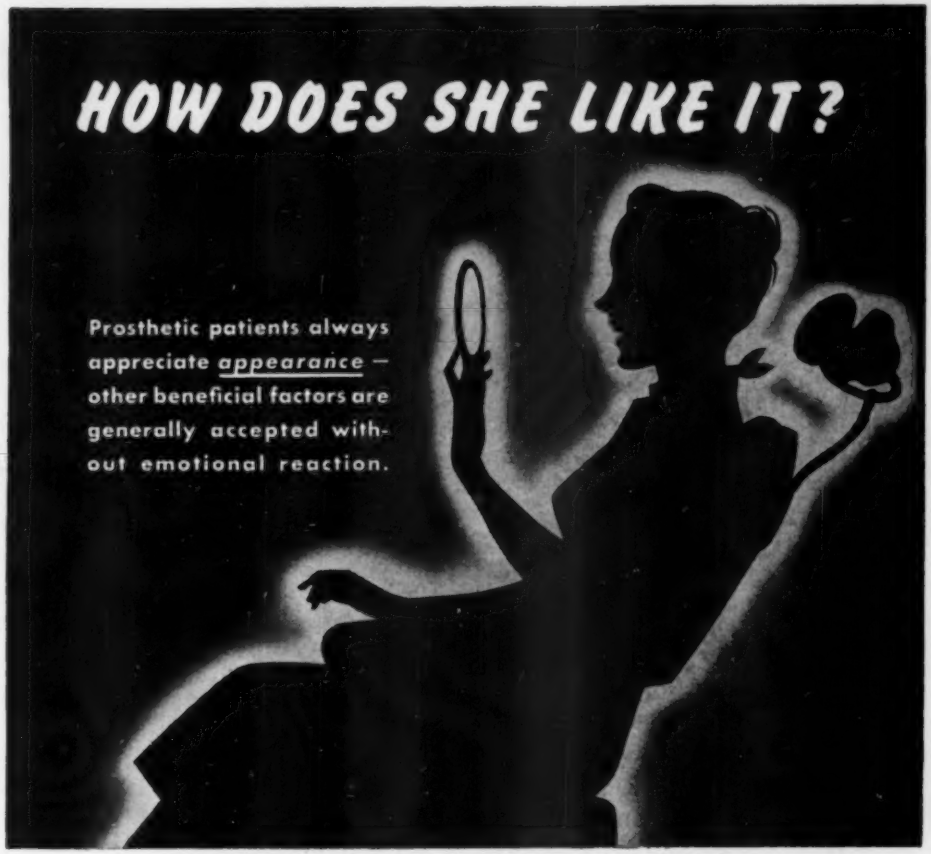

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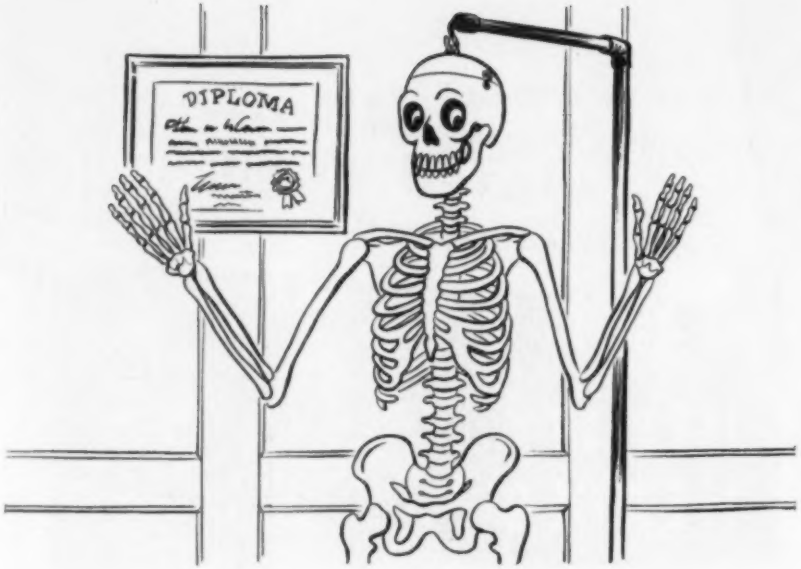

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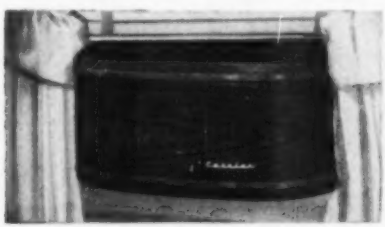

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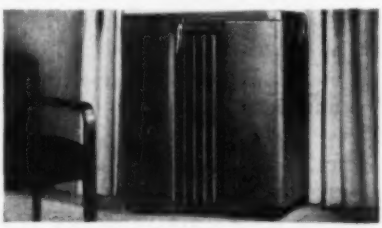

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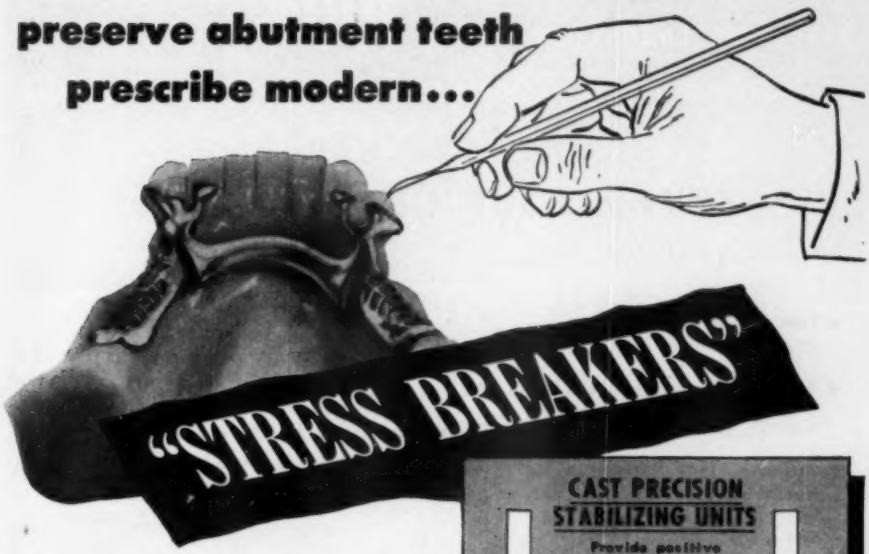

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DENTAL ROENTGENOLOGIC ASPECTS OF SYSTEMIC DISEASE

Edward C. Stafne, D.D.S., Rochester, Minn.

THE use of dental roentgenology in the field of medical diagnosis up to the present time has been very limited, if its use in the search for sources of dental focal infection is excluded. However, it has long been recognized by many that manifestations of numerous systemic diseases involve the jaws. Particularly does this apply to the skeletal diseases.

While reference is made in the medical literature to oral roentgenologic changes in systemic diseases, the frequency of occurrence of these changes is not fully appreciated. This is because the incidence of involvement of the jaw has not been studied adequately and such studies have not been based on evidence revealed by the intraoral dental roentgenograms. Roentgenograms of the head, which are commonly used in the differential diagnosis of skeletal disease, do not offer satisfactory views of the jaws and the teeth. A study by Stafne and Austin[1] based on dental roentgenograms in a series of cases of Paget's disease revealed definite evidence of the disease in 17 per cent of the cases, an appreciably higher incidence than previously supposed. In some of these cases roentgenograms made of the skull gave no evidence of this disease.

It is the dentist who is associated with hospitals and medical units who obviously has the opportunity to observe a larger number of cases in which there are dental roentgenologic manifestations of systemic disease. Not only may the dental findings be of value in making a differential diagnosis, but in some instances, abnormal conditions of patients who are undergoing a general physical examination would remain undiagnosed if it were not for a dental roentgenologic examination which gives a clue to the correct diagnosis. This has been recognized by many internists, and Albright and Reifenstein[2] stated that several cases of

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From the Section on Dental Surgery, Mayo Clinic, Rochester, Minn.

1. Stafne, E. C., and Austin, L. T., A Study of Dental Roentgenograms in Cases of Paget's Disease (Osteitis Deformans), Osteitis Fibrosa Cystica and Osteoma. *J.A.D.A.* 25:1902 (Aug.) 1938.

2. Albright, Fuller, and Reifenstein, E. C., *The Parathyroid Glands and Metabolic Bone Disease; Selected Studies.* Baltimore: The Williams and Wilkins Company, 1948, p. 57.

hyperparathyroidism in the series at the Massachusetts General Hospital were picked up by the dental department. In the case of hyperparathyroidism, as well as other diseases in which there are skeletal manifestations, this statement can be substantiated by experiences at the Mayo Clinic.

Of the dental specialties the orthodontists have been particularly interested in conditions which influence the skeletal development as well as in other medical conditions of their patients. This interest is evidenced by the inclusion of many valuable papers and abstracts on the subject in the orthodontic literature. While malocclusion in most instances no doubt is caused by local and genetic factors, there are many instances in which malocclusion and other dental abnormalities are associated with skeletal manifestations of systemic disease, diseases in which orthodontic measures instituted are usually not successful except in the event that the general condition present can be treated successfully. Becks,[3] in evaluating routine dentomedical examinations made for a series of orthodontic patients with a view to determining good and poor risks, found that of the general conditions which might influence treatment, endocrinopathy accounted for slightly more than half. Other conditions noted were developmental disturbances, dietary deficiency diseases, congenital syphilis and tuberculosis.

It was also found that delay in the time of eruption of teeth, particularly until late in life, was suggestive of systemic or constitutional factors, whereas in general, all classes of malocclusion are more frequently accompanied by early eruption of teeth. Obviously, diseases with skeletal manifestations, be they of endocrine, developmental, inflammatory or dietary origin, present a problem and are of concern to the orthodontist. The borderline conditions are of particular interest for they are more difficult to recognize.

In the consideration of the effects of systemic disease upon the teeth and their supporting osseous structures or jaws, the dental and oral features will be dealt with primarily from the standpoint of the dental roentgenologist. To conserve space, only intraoral dental roentgenograms are shown. In some instances such roentgenograms are adequate; in others, supplementary extraorally placed films would be necessary to obtain roentgenograms that would show all the boundaries of the lesion. Conditions that will be discussed briefly are some of those which are associated with disturbances of the endocrine glands, avitaminosis, skeletal developmental disturbances, inflammatory diseases of the bone, Paget's disease, multiple myeloma, ectodermal dyplasia and acrosclerosis. In many conditions the dental roentgenogram presents a characteristic picture which, of course, may vary with the stage at which the disease is observed. A characteristic roentgenographic picture of the disease may have been greatly altered as a result of therapeutic measures that may already have been instituted, and roentgenologic evidence of the disease is not always present in the teeth and jaws, although present in other bones of the skeleton.

Endocrine Disturbances

The endocrine glands are ductless glands that produce hormones which are secreted into the blood stream and play the role of catalyzers and regulate cellular processes such as growth and metabolism. The endocrine glands which are known to have an influence upon the skeleton are the pituitary, sex, thyroid, adrenal and parathyroid glands, and any disturbance which is caused by a quantitative change in the hormones, be it overproduction or underproduction, may pro-

3. Becks, Hermann, Orthodontic Prognosis: Evaluation of Routine Dentomedical Examinations to Determine "Good and Poor Risks." *Am. J. Orthodontics* 25:610 (July) 1939.

duce a disturbance of growth and metabolism of bones. Schour and Massler[4] stated that the teeth and jaws reflect endocrine dysfunction just as do other organs and tissues. They go on to say that teeth, because of highly specialized structures, are valuable for analysis of endocrine function and that they often reflect effects with kymographic accuracy.

Pituitary Gland.—The pituitary gland is situated within the sella turcica at the base of the skull and has an anterior and a posterior lobe. The gland secretes several hormones, some of which influence the secretion of hormones by other endocrine glands. The anterior lobe of the gland produces those hormones which influence the skeleton, including its growth.

A deficiency in the secretion of the growth hormone of the pituitary gland results in a decrease in the growth of all tissues, soft and skeletal, and is called hypopituitarism. When it occurs early in life the result is the pituitary dwarf. Since the nervous system develops early, the mental age is well above the developmental age. The effect upon the growth of the jaws is similar to that upon the rest of the skeleton. Though the size of the teeth is not affected, interference with normal osseous development results in retarded development of the roots and retarded eruption of the teeth.[5]

Overproduction of the growth hormone from the pituitary gland produces an overgrowth of those parts of the body which are still capable of growth at the time of onset of hypersecretion. This condition is called hyperpituitarism. If onset is prior to 5 or 6 years of age when all structures are undergoing active growth there is a uniform overgrowth of all parts of the body. The result is a person who is fairly well proportioned and of abnormally large stature; the condition is referred to as giantism. The onset of hypersecretion during the juvenile period also produces giantism but disproportion of growth, since some structures may have attained adult proportions prior to the onset. One of the parts which undergo disproportion and excessive growth is the mandible, and the result is prognathism.

In acromegaly or hyperpituitarism in the adult, overgrowth occurs in those parts in which growth persists in the adult: the terminal parts of the body, toes, fingers, nose and skull. According to Weinmann and Sicher,[6] the central feature of acromegalic change in the skull is the enormous enlargement of the mandible. Cellular activity appears to be greater at the sites of formation of endochondral bone, and since the mandible grows by endochondral ossification at the condyle, there is a great increase in height of the ramus. This leads to continued or supraeruption of the teeth, followed by an apposition of bone at the alveolar crest which increases the height of the mandibular body. The result is decided prognathism. Changes in occlusion may vary considerably, and according to Korkhaus[7] the formation of spaces between the teeth and their outward tilting are among the most reliable symptoms of acromegaly, and serve to differentiate it from anomalous mandibular protrusions which are of definite genetic and hereditary origin. He is of the opinion that the spacing and tilting which occurs in both jaws in acromegaly is produced by abnormal stress and pressure of macroglossia.

The roentgenographic appearance of bone in the acromegalic jaw is not altered; therefore, the dental roentgenogram is of diagnostic value only in that it serves to rule out Paget's disease and

4. Schour, Isaac, and Massler, Maury, Endocrines and Dentistry. *J. A. D. A.* 30:595 (April); 763 (May); 943 (June) 1943.

5. Cohen, M. M., and Wagner, Richard, Dental Development in Pituitary Dwarfism. *J. D. Res.* 27:445 (Aug.) 1948.

6. Weinmann, J. P., and Sicher, Harry, *Bone and Bones; Fundamentals of Bone Biology.* St. Louis: The C. V. Mosby Company, 1947, pp. 180-206.

7. Korkhaus, Gustav, The Changes in the Form of the Jaws and in the Position of the Teeth Produced by Acromegaly. *Internat. J. Orthodontia* 19:160 (Feb.) 1933.

other deformities that do produce abnormal changes.

Thyroid Disease.—The thyroid gland produces thyroxin, a hormone which regulates the basal metabolic rate, which in turn has an effect upon growth and development.

In hypothyroidism there is a deficiency in the secretion of thyroxin which results in retardation of growth, the degree of which is largely dependent upon the time of onset and degree of lack of the hormone. Hypothyroidism is divided into three types: cretinism, when it is present at birth; juvenile myxedema, when it occurs during infancy and childhood; adult myxedema, when the onset is after puberty, in which case no gross changes in the skeleton are produced. When hypothyroidism occurs at birth or during the first years of life, growth almost stops in nearly all tissues, and the result is a disproportionately formed dwarf known as a cretin. The jaws are small and underdeveloped. The shedding of the deciduous teeth is delayed and eruption of the permanent teeth is retarded. The development of the roots of the teeth is greatly retarded, although the teeth themselves are not dwarfed.

The dental roentgenograms of a girl 13½ years of age in whose case a diagnosis of cretinism had been made are shown in Figure 1. They revealed retardation in development of the permanent teeth. The development of the bones of the wrists and hands was well behind the chronologic age; the dentition was approximately six years behind the chronologic age. The condition had been recognized early, and the therapy instituted may have altered the degree of development appreciably.

Hyperfunction of the thyroid gland, or hyperthyroidism, when it occurs in children may, in contrast to hypofunction, accelerate skeletal growth, including development and eruption of teeth. There may also be an osteoporosis. A case of hyperthyroidism in a child 5 years of age in which the dentition corresponded to that

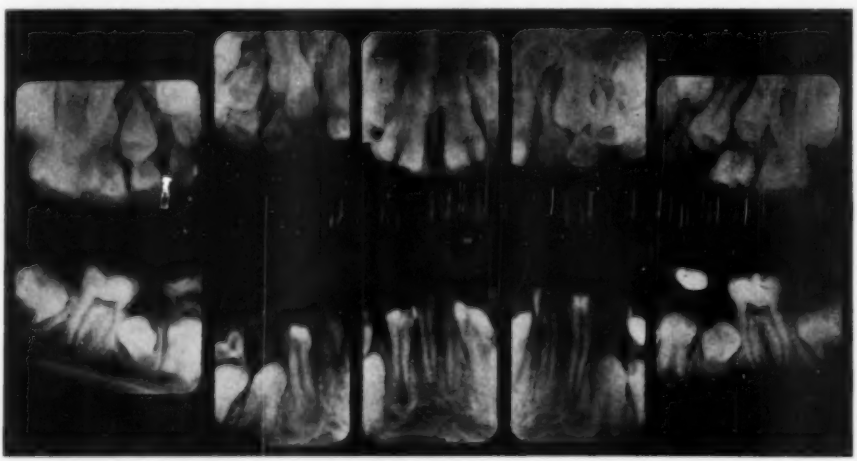

Fig. 1.—Cretinism. The permanent mandibular central incisors and first molars have recently erupted. The remaining permanent teeth which remain unerupted show retardation of development as evidenced by the short roots with wide-open root canals

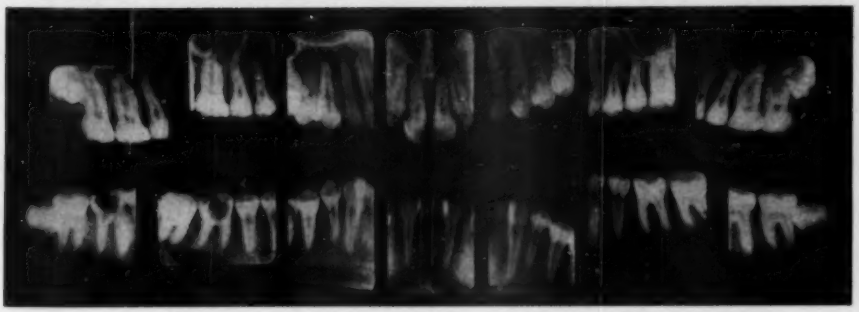

Fig. 2.—Hyperthyroidism. Roentgenograms showing definite osteoporosis. The teeth erupted prematurely, and there was malocclusion

of a child 9 years of age was reported by Welti.[8] The deciduous teeth had begun to shed at 3½ years of age and the skeletal age was that of a child 10 to 12 years old. Middleburgh[9] also reported early eruption of teeth in a case of hyperthyroidism in which the maxillary first molars and mandibular incisors had erupted at 4 years and 11 months of age.

The dental roentgenograms of a girl 12 years of age who had hyperthyroidism are shown in Figure 2. They revealed a definite osteoporosis. The teeth had erupted prematurely, and there was malocclusion with malposition of the mandibular incisors. In view of the osteoporosis present, prognosis for successful orthodontic treatment would be doubtful until the general condition had been treated successfully.

Toxic goiter may, in the adult, also produce osteoporosis. At the clinic, where a large number of cases of toxic goiter are encountered, an attempt has been made to evaluate the degree of osteoporosis present in such cases on the basis of evidence revealed by dental roentgenograms. However, the degree of osteoporosis present as evidenced by the dental roentgenogram does not vary sufficiently from that of many patients in whom the general physical examination gives essentially normal results to be of diagnostic value.

Parathyroid Disease.—The hormone secreted by the parathyroid glands has a decided effect on the metabolism of calcium and phosphorus and, indirectly or directly, on the metabolism of bone.

Hypoparathyroidism results in hypocalcemia which produces neuromuscular excitability, tetany and even general convulsions. It may be caused by accidental removal of or damage to the glands in the course of thyroidectomy, and it may be idiopathic. Here it is of interest to note Kronfeld's[10] comment that the evidence of relationship between the parathyroid glands, tetany and convulsions and hypoplasia of enamel is rather conclusive. Albright and Strock[11] have observed that when hypoparathyroidism has developed prior to completion of development of the teeth, aplasia or hypoplasia occurs at that point in their development at which the hypoparathyroidism was first experienced. In the event that it occurs prior to complete formation of the enamel,

8. Welti, H., quoted by Schour, Isaac, and Massler, Maury.[4]

9. Middleburgh, H., Hyperthyroidism and Early Eruption of Teeth. *Am. J. Orthodontics* (Abstr.) 25: 597 (June) 1939.

10. Kronfeld, Rudolf, Histopathology of the Teeth and Their Surrounding Structures, ed. 2. Philadelphia: Lea and Febiger, 1939, p. 43.

11. Albright, Fuller, and Strock, M. S., The Association of Acalcification of Dentine With Hypoparathyroidism in Rats and the Cure of Same With Parathormone, With Some Correlated Observations in Man. (Abstr.) *J. Clin. Investigation* 12:974, 1933.

hypoplasia of the enamel will result. If the crown has already formed, the hypoplasia may be evidenced by short, underdeveloped roots. Dental roentgenograms in a case of idiopathic hypoparathyroidism reported by Lovestedt[12] are shown in Figure 3. They revealed hypoplasia of enamel of the premolar, and the second and third molar teeth. The patient was a girl 15 years of age when first seen, who had had convulsive seizures with spasms

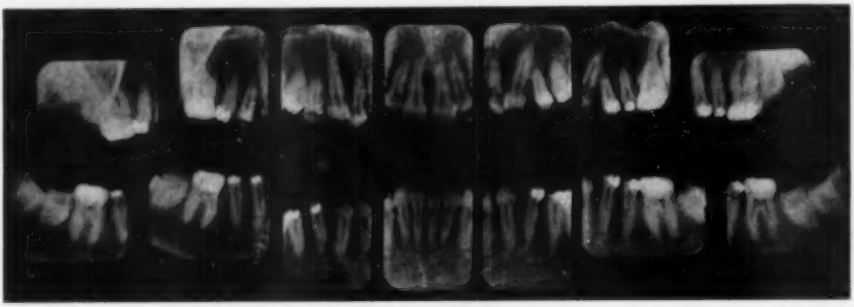

Fig. 3.—Hypoparathyroidism. Roentgenograms revealing enamel hypoplasia of the premolars and of the unerupted second and third molar teeth. The dental defects present suggest that the onset of the disease occurred approximately between 2 and 3 years of age

of the hands at the age of 3 years. The development of the bone was comparable to that of an 11 year old child. Calcification of the cerebral basal ganglia, which according to Camp[13] is significant in the diagnosis of parathyroid insufficiency, was also present. The dental roentgenograms shown in Figure 3 were made when the patient was 17 years of age.

In hyperparathyroidism there is an increased secretion of parathyroid hormone. Primary hyperparathyroidism is produced when more parathyroid hormone is secreted than the body requires. Secondary hyperparathyroidism occurs when an increased production of parathyroid hormone appears to be a secondary response to some other condition. Disease of bone is not essential but when the skeletal features of the disease are present the symptoms referable to the jaws are similar in both primary and secondary types. When all the bones of the body are involved, the condition is designated "osteitis fibrosa cystica generalisata."

In recent years, there has probably been greater interest by the internist in the dental and oral manifestations of hyperparathyroidism than in those of any other disease, for often the earliest evidence of osseous degeneration appears in the jaws. Keating[14] is of the opinion that dental roentgenograms have a special value, particularly in the recognition of the disease in cases in which there is minimal disease of the bone, and goes on to say, "The technical superiority of roentgenograms of the bone surrounding the teeth plus the special advantage provided by the uninvolved teeth as a gauge of density make dental roentgenograms particularly useful in the recognition of mild degrees of skeletal involvement.

12. Lovestedt, S. A., The Dental Picture of Spontaneous Parathyroid Insufficiency. (Unpublished data.)

13. Camp, J. D., Symmetrical Calcification of the Cerebral Basal Ganglia; Its Roentgenologic Significance in the Diagnosis of Parathyroid Insufficiency. *Radiology* 49:568 (Nov.) 1947.

14. Keating, F. R., Jr., Hyperparathyroidism. *Am. J. Orthodontics (Oral Surg. Sect.)* 33:116 (Feb.) 1947.

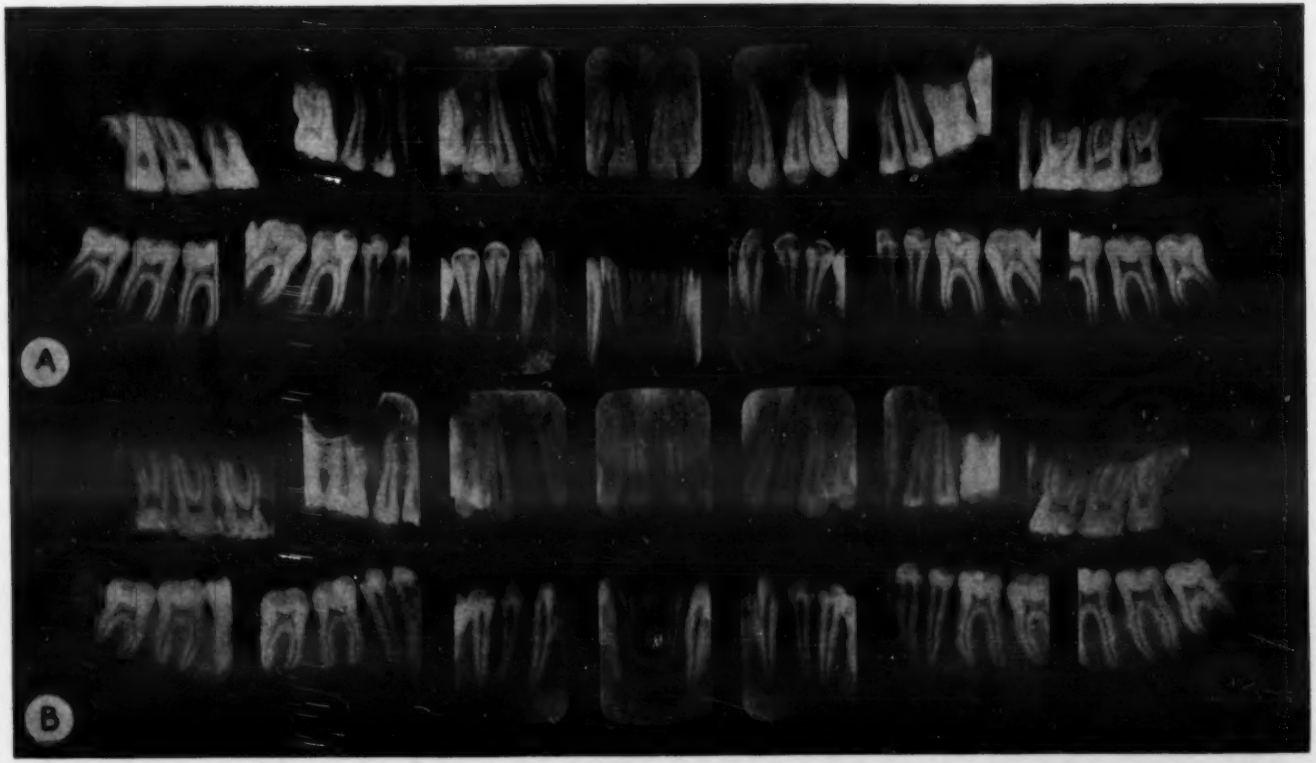

Fig. 4.—Hyperparathyroidism. A: Pronounced osteoporosis of both jaws, absence of the lamina dura, and teeth which appear dense by contrast but which are of normal radiopacity. B: Six months after surgical treatment. With the exception of a few regions, the bone has returned to normal appearance and the lamina dura has reappeared

Mild demineralization, early distortion of the trabecular pattern, and disappearance of the lamina dura sometimes provide more specific clues to the diagnosis than do changes elsewhere in the skeleton."

The disease as seen in the dental roentgenogram is evidenced by the abnormal radiolucency of bone, and a transformation of this bone into finely meshed, lacelike trabeculae that have a ground-glass appearance. Areas of fibrosis where the trabeculae of the bone are mostly destroyed will appear cystlike, and in some regions where the areas of radiolucence are more circumscribed, actual tumor formation may be present. The lamina dura may be partially or completely absent, depending on the severity of the disease, and the teeth in which there is no alteration in the content of mineral salt stand out in contrast to the dark-appearing osteoporotic bone. The teeth, although not necessarily loose in their sockets, may be very motile, particularly in cases of advanced disease, largely because of the softness of bone, and there may be malocclusion and resorption of the roots of the teeth in regions of cyst formation. There is a definite predilection to tumor formation in the jaws, and Strock,[15] who studied dental roentgenograms in 45 cases of hyperparathyroidism, noted that about half of them showed evidence of giant cell tumors. As time goes on and as the disease is recognized more often in the earlier stages, the incidence of tumor formation will no doubt be decreased.

While all giant cell tumors of the jaws are by no means associated with hyperparathyroidism, their occurrence in the jaws should suggest the possibility of the presence of the disease. Operation on giant cell tumors of the jaws on the premise that they were merely local lesions has been done.

Following successful treatment of the disease, there is a decided change in the roentgenographic appearance of the bone of the jaws, as well as bones elsewhere. Bone in which fibrosis has not been too extensive will return to normal, leaving no evidence as to what has taken place. Regions in which the trabeculae have been extensively or completely destroyed may be replaced by sclerotic bone which is denser and more radiopaque than normal bone. The picture is one which often permits a diagnosis of successfully treated hyperparathyroidism to be made from the roentgenographic evidence.

The dental roentgenograms shown in Figure 4A were made of a male patient 20 years of age who had primary hyperparathyroidism, produced by an adenoma of the parathyroid gland. The bone of both jaws was osteoporotic and the alveolar portion so soft that in the anterior regions it could be moved by pressure of the fingers. There is considerable radiolucency of the bone in contrast to the unaffected teeth. Roentgenograms made six months after surgical treatment revealed a decided increase in radiographic density of the bone (Fig. 4B).

Disease of the Gonads.—Besides functioning as organs of reproduction, the gonads also secrete a hormone which controls the development and growth of the sex organs, affects skeletal maturation and causes eventual cessation of osseous growth.

In hypogonadism the appearance of the secondary sex characteristics is delayed. Maturation of some of the parts of the skeleton is also delayed and as a result there is an overgrowth of bones, including the bones of the jaws. The teeth undergo normal development, but are prone to erupt prematurely.

In virilism or precocious puberty, which is sometimes secondary to adrenal cortical tumor, there is an overproduction of male hormones which causes an early appearance of sex characteristics and,

15. Strock, M. S., The Mouth in Hyperparathyroidism. *New England J. Med.* 224:1019 (June 12) 1941.

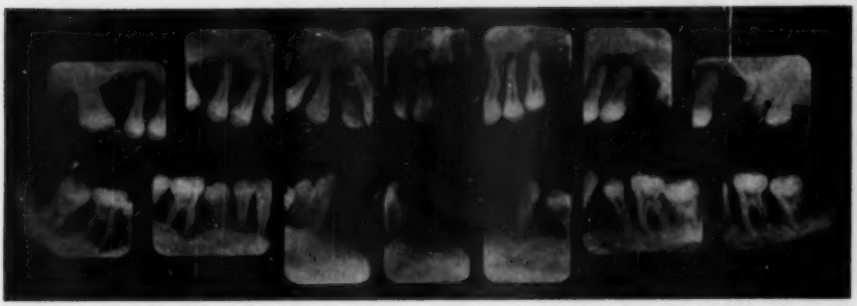

Fig. 5.—Diabetes (juvenile). Roentgenograms showing destruction of the alveolus and bone to the extent that many of the teeth remained unsupported by bone. Some teeth had been exfoliated; many of those remaining were fairly firmly fixed in soft tissue

among other things, an early and accelerated maturation of the skeleton. Early development and eruption of the teeth may occur. White[16] has reported a case in which the deciduous dentition was completed at the age of 1 year, and the second detention at the age of 3 years.

Disease of the Pancreas.—The pancreas has both endocrine and exocrin functions. The islands of Langerhans secrete insulin which serves to maintain the normal level of blood sugar. An underproduction of insulin produces diabetes mellitus (hypoinsulinism).

It has long been generally thought that periodontal disease is associated with and even considered a pathognomonic symptom of diabetes, although this has often been questioned, probably because diabetes occurs most often in older persons and at a time when periodontal disease is also prevalent among all persons. However, Lovestedt and Austin,[17] among others, have found that the incidence of active and advanced periodontoclasia or periodontosis is slightly greater among diabetic patients than among nondiabetic patients.

Observations made in juvenile diabetes should be of greater value, however, for periodontosis is not common in children. Rutledge,[18] who made clinical and dental roentgenologic studies in diabetic children, found a high incidence of alveolar atrophy and emphasized that in such studies it was very important to know whether the diabetic condition was being controlled.

Periodontal lesions are by no means a constant feature in juvenile diabetes, yet on occasion such striking and marked destruction of alveolar bone occurs that it would be difficult to explain its presence on the basis of coincidence only.

The dental roentgenograms in such a case are shown in Figure 5. The patient was a boy 18 years of age who had a history of diabetes for 12 years. It is doubtful whether the diabetic condition had been kept under control, for the patient had not been too cooperative in following the dietary regimen, or in the taking of insulin. The amount of destruction of alveolar bone as revealed by the roentgenograms was far greater than would be expected from the results of the clinical examination, and surprisingly

16. White, A., Quoted by Thoma, K. H., *Oral Pathology*. St. Louis: The C. V. Mosby Company, 1941, p. 171.

17. Lovestedt, S. A., and Austin, L. T., Periodontoclasia in Diabetes Mellitus. *J.A.D.A.* 30:273 (Feb.) 1943.

18. Rutledge, C. E., Oral and Roentgenographic Aspects of the Teeth and Jaws of Juvenile Diabetics. *J.A.D.A.* 27:1740 (Nov.) 1940.

many of the teeth were firmly fixed in soft tissue even though all of their supporting bone had been destroyed.

Avitaminosis

Vitamins have an action similar to that of hormones and are derived from foods that are ingested. A deficiency of some vitamins in the diet is known to have an influence upon skeletal development, including development of the teeth. The oral manifestations of pellagra in vitamin B complex deficiency and of scurvy in vitamin C deficiency are well known. The effect of vitamin D deficiency upon the teeth and their supporting osseous structures has probably received the most attention in the dental field.

Vitamin D Deficiency.—The role of vitamin D in metabolism is to maintain the level of calcium and phosphorus and the normal ratio of these two substances. A deficiency of vitamin D causes rickets in childhood and osteomalacia in the adult.

Rickets affects primarily the growing skeleton, largely through a failure of the osteoid tissue to undergo calcification properly, with the result that the bones remain soft, bend and become deformed. Follis, Jackson, Eliot and Park[19] have shown by microscopic examination that there is a high incidence of rickets, particularly in children who are ill, and while they doubt if a slight degree of rickets interferes with development, the severer forms do. The disease is most prevalent from 3 months to 3 years of age; therefore, rickets is associated with a relatively high incidence of hypoplasia of the enamel of the teeth. In severe cases the jaws are underdeveloped and there is retardation in the shedding of the deciduous teeth, as well as in eruption of the permanent teeth. In late rickets, which occurs after 6 years of age, the dental disturbance is less severe. The effects of primary rickets upon the dental system have been dealt with extensively in the dental literature.

19. Follis, R. H., Jr., Jackson, Deborah, Eliot, Martha M., and Park, E. A., Prevalence of Rickets in Children Between Two and Fourteen Years of Age. *Am. J. Dis. Child.* 66:1 (July) 1943.

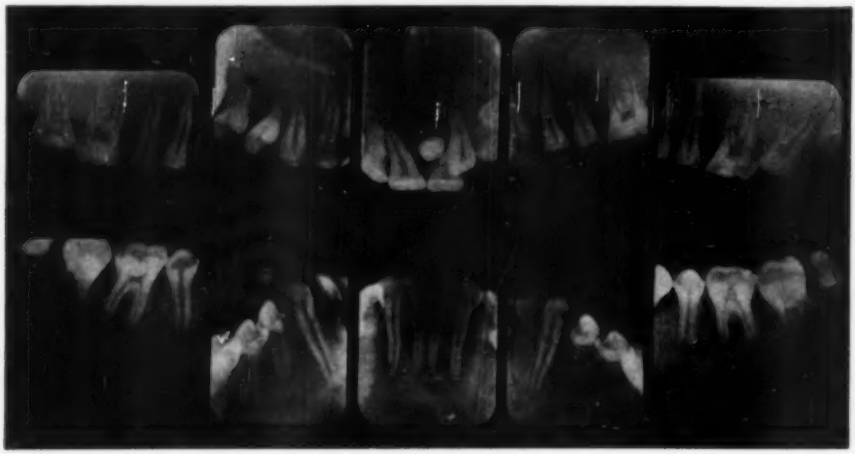

Fig. 6.—Renal rickets. Roentgenograms show absence of normal bone cancellations giving a wooly, ground-glass appearance. There is absence of lamina dura, and retarded development of the roots of the teeth.

Renal rickets is a form of disturbed calcium-phosphorus balance which is secondary to chronic nephritis; it may cause skeletal deformity and disturbed development of the jaws and teeth. The jaws are osteoporotic and underdeveloped, and the eruption of the permanent teeth is retarded. Pancoast, Pendergrass and Schaeffer[20] stated that as a rule the roentgenographic appearance of the bones is one of greater translucency and sponginess than is that of rickets due to vitamin D deficiency.

Dental roentgenograms of a boy 14 years of age, who had all the criteria for renal rickets and renal dwarfism, are shown in Figure 6. There was a transformation of bone cancellations throughout both jaws, giving a wooly appearance, and there was an absence of lamina dura. The roentgenographic appearance was very similar to that seen in hyperparathyroidism. The bone was more radiopaque than is usual, probably as a result of treatment which had been followed by improvement in the patient's general condition. The teeth were fully erupted, although the patient gave a history of having the first permanent tooth erupt at the age of 9 years. Several teeth were malposed. Completion of calcification of the roots of the teeth was retarded as evidenced by wide-open apical foramens on the second bicuspids and second molars. A mesiodens was present, which was erupting on the palatal surface.

While renal rickets is discussed in this paper under the heading, "Avitaminosis," it should be pointed out that the disease may actually be a form of hyperparathyroidism.

Developmental Disturbances of the Skeleton

Inheritance factors play an important part in many of the developmental disturbances of the skeleton. In some instances the symptoms may be present at birth; in others they may develop during childhood or adolescence. Among these skeletal diseases are Albers-Schönberg disease (marble bone), osteogenesis imperfecta, achondroplasia and cleidocranial dysostosis.

Albers-Schonberg Disease. — Albers-Schönberg disease is hereditary, and while usually congenital, it may also develop in postnatal life, in which event it is usually less severe. There is a generalized osteosclerosis and elimination of bone marrow caused by a reduction in osteoclastic activity. The sclerotic bone is of poor quality, and although it is referred to as "marble bone," in reality it cuts like chalk and is very fragile. Fractures are, therefore, not uncommon. There is also decreased resistance to infection, and several cases of osteomyelitis of the jaws have been reported.

As in other bones, the jaws show a great increase in roentgenographic density in the disease. There may be delayed eruption of the teeth and early elimination of the pulp chamber by a formation of secondary dentin. Normal development of the teeth may also be interfered with.

The dental roentgenograms of a male 28 years of age who had Albers-Schönberg disease are shown in Figure 7. The roentgenograms revealed a pronounced increase in radiographic density of bone and underdevelopment of the roots of the teeth. A diagnosis of the condition had not been made prior to roentgenographic examination, and roentgenograms of other bones revealed marked density. A brother also had the same condition and apparently a similar anomaly of the teeth, for the teeth had been lost early and were said to have had no roots.

Achondroplasia. — Achondroplasia is a hereditary disease in which a disturbance

20. Pancoast, H. K., Pendergrass, E. P., and Schaeffer, J. P., *The Head and Neck in Roentgen Diagnosis.* Springfield, Illinois: Charles C Thomas, 1940.

of the formation and development of cartilage is the essential feature. Very little growth takes place at the epiphysis of the long bones, and the result is a dwarf whose extremities are very short in comparison to the torso. Other characteristics are a prominent forehead, saddle nose, retruded upper jaw and prognathous lower jaw. While the teeth undergo normal development, there may, in some instances, be a disturbance in their eruption. Miller[21] reported on the dental condition of a patient 13 years of age "who had achondroplasia" and found that the bicuspid teeth and second molars in both jaws were unerupted.

The dental roentgenograms in Figure 8, made of a typical achondroplastic dwarf at the age of 30 years, revealed 24 embedded teeth, including 5 deciduous molars that had undergone almost complete resorption. It is doubtful if the deciduous teeth had ever been erupted. With the exception of noneruption of the deciduous teeth, the condition was very similar to that seen in cleidocranial dysostosis. There was a history of early onset and a familial tendency. The teeth were of normal size, with the exception of a rudimentary right maxillary third molar.

Cleidocranial Dysostosis. — Cleidocranial dysostosis is usually of hereditary transmission. An instance in which a father and three children were afflicted is reported by Heupel.[22] It is characterized by complete or incomplete aplasia of the clavicles, delayed ossification of the fontanels and delayed eruption and non-

Fig. 7.—Albers-Schönberg disease. Roentgenograms showing bone of increased roentgenographic density, absence of narrow spaces, underdeveloped roots and reduction in size of the pulp chambers

eruption of the teeth. Although it has generally been assumed that the disturbance is confined to the membranous bones, other bones may be involved as well, and the condition is more generalized than was formerly supposed. There is underdevelopment of the maxilla which results in a relatively prognathous mandible.

Abnormalities of the teeth and jaw are almost a constant feature. These have been well described in the dental literature. Millhon and Austin[23] reported 4 cases, in 1 of which orthodontic measures had been attempted to correct the abnormalities present. The condition is

21. Miller, H. A., Dental Abnormalities in a Patient With Achondroplasia. *Internat. J. Orthodontia* 23:296 (March) 1937.

22. Heupel, R. G., Cleidocranial Dysostosis. (Abstr.) *J. D. Res.* 15:186 (June-Aug.) 1935.

23. Millhon, J. A., and Austin, L. T., Dental Findings in Four Cases of Cleidocranial Dysostosis. *Am. J. Orthodontics (Oral Surg. Sect.)* 30:30 (Jan.) 1944.

characterized chiefly by underdevelopment of the maxilla, prolonged retention of the deciduous teeth, noneruption of the permanent teeth and the formation of supernumerary dental structures. Failure of the deciduous teeth to shed and of the permanent teeth to erupt is probably due to the character of the bone. The bone is unable to produce resorption of the roots of the deciduous teeth and also fails to resorb in response to the eruptive force of the permanent teeth.

In cases in which a large number of unerupted teeth and also supernumerary dental structures are observed, the presence of cleidocranial dysostosis should be suspected. A case in point is that of a boy 9 years old for whom the dental roentgenograms shown in Figure 9 were made. All the deciduous teeth were still present and there was no evidence that the roots of these teeth had begun to undergo resorption. The dental development in general was retarded. The presence of anomalous and malformed supernumerary teeth in all lateral incisor regions, and prolonged retention of the deciduous teeth suggested cleidocranial dysostosis. On investigation, a roentgenogram revealed the absence of both clavicles, and a roentgenogram made of the boy's father revealed that both of his clavicles were absent also. It should be kept in mind that the diagnosis depends largely on the roentgenologic examination, and such an examination is essential in establishing a familial relationship.

Hand-Schüller-Christian's Disease

Hand-Schüller-Christian's disease is a disturbance of the reticulo-endothelial system. The disease occurs most often early in life, and combines defects in bone, exophthalmos and diabetes insipidus, although the triad of symptoms may not be present in all cases. The defects in bone are produced by granuloma-like accumulations of connective tissue in which there may be a large number of foam cells loaded with fat. The osseous defects occur most frequently in the calvaria, jaws, scapula, pelvis and ribs, and in some instances the first symptoms of the disease may occur in the jaws. Involvement of the jaws is common. Kennedy[24] reported 8 cases in 5 of which the jaws were involved. Schaefer and Williams[25] and Austin[26] have reported cases

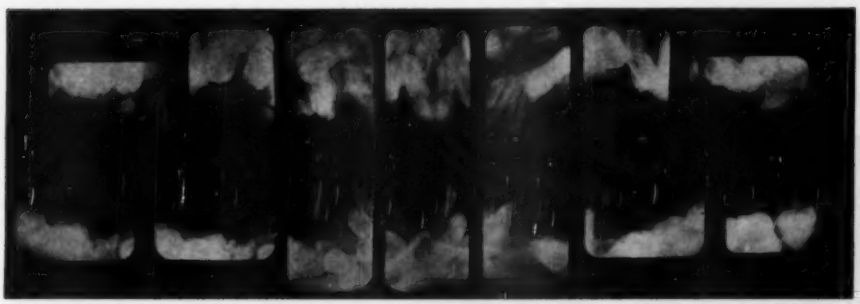

Fig. 8.—Achondroplasia. Roentgenograms revealed noneruption of 20 permanent teeth and of the mandibular deciduous molars which had undergone resorption

24. Kennedy, R. L. J., Xanthomatosis: Schüller-Christian's Disease. *Proc. Staff Meet., Mayo Clin.* 13: 776 (Dec. 7) 1938.

25. Schaefer, J. E. and Williams, P. E., Xanthomatosis (Schüller-Christian's Disease). *Den. Cosmos* 74: 879 (Sept.) 1932.

in which the jaws have been involved.

The roentgenographic appearance of the lesions in bones, particularly those of the skull, is distinctive and diagnostic, and that of the jaws, when the disease occurs in children, is probably even more so. In the jaws of children, the pads of granulomatous tissue have a predilection for forming in the periapical regions of the teeth. With expansion of the lesions the sockets are destroyed and the deciduous as well as developing permanent teeth are forced from their original positions and exfoliated. With the bone surrounding the teeth destroyed, the roentgenograms give the appearance that the exfoliating teeth are floating in space.

Figure 10 shows the typical roentgenographic appearance of Hand-Schüller-Christian's disease of the jaws in a boy 8 years of age. The first lesion had apparently occurred in the calvarium four years previously. One year prior to the time the roentgenograms were made, the right maxillary deciduous cuspid and molar teeth and the two mandibular deciduous second molars had become loose and were lost. This was followed by exfoliation of the two mandibular bicuspids on the left and the second bicuspid on the right. The roentgenograms reveal extensive destruction of bone in the posterior regions of the mandible and the right maxilla, which means that the right maxillary lateral incisor and bicuspids and the remaining mandibular posterior teeth will be lost.

If the involvement of the jaw is recognized early, roentgen therapy may, in a measure, prevent extensive loss of teeth, since it has proved to be a successful means of destroying the lesions which occur in other bones. At present I have under observation a patient with an early lesion of the jaws that has been treated by roentgen rays, and while the outcome is uncertain, the results have been encouraging.

Multiple Myeloma

A myeloma is a neoplasm formed from bone marrow cells which belong to the

96. Austin, L. T., Xanthomatosis (Schüller-Christian's Disease): Report of Dental Findings in One Case. *J. O. S.* 4:209 (July) 1946.

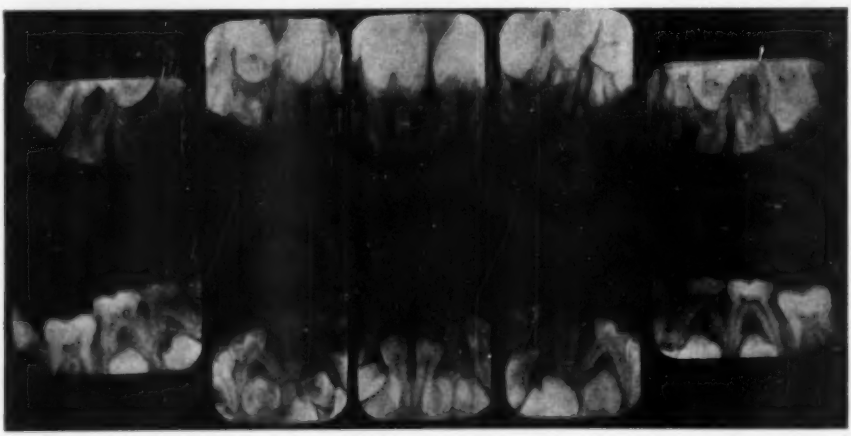

Fig. 9.—Cleidocranial dysostosis. Roentgenograms showing nonresorption of the roots of the deciduous teeth and supernumerary dental structures in the lateral incisor regions of both jaws

Fig. 10.—Hand-Schüller-Christian's disease. Roentgenograms showing pronounced destruction of bone in the right maxilla and posterior regions of the mandible. The teeth in the regions of destruction are being exfoliated, including some of those which are still undergoing development

plasma cell series. Multiple tumors which destroy bone may be widely distributed, particularly in the spinal column, clavicles, sternum, ribs and skull. The prognosis is very poor in this condition, and life expectancy is only a few years.

The general roentgenographic appearance has been described by Pancoast, Pendergrass and Schaeffer.[20] In the early stages, small radiolucent regions are confined to the bone marrow. As these become more numerous, they coalesce to form larger lesions which are seen as large, irregularly defined regions of radiolucence. In the jaws, roentgenographic evidence of multiple myeloma is most often seen in the mandible, where it follows a pattern similar to that described for other bones. Evidence of the initial lesion usually appears in the posterior regions where the marrow spaces are largest and tend to extend along and below the mandibular canal. The disease process also tends to extend toward the alveolar crest in edentulous spaces, and in one instance the earliest roentgenographic evidence of tumor formation was observed in an edentulous space. The roentgenographic appearance of multiple myeloma as seen in the jaws is not diagnostic. The lesions in this disease may simulate giant cell tumor, and ameloblastoma and other tumors. In some instances surgical procedures have been performed on the assumption that they were local lesions.

Dental roentgenograms of a woman 57 years of age, who was suffering from extensive multiple myeloma, are shown in Figure 11. They revealed extensive destruction of bone in both sides of the mandible, particularly along the lower border and also extending up into the edentulous spaces. There were multilocular cystic spaces, very similar roentgenographically to those seen in ameloblastoma.

Paget's Disease

Paget's disease is a disease of the skeleton which occurs most often after middle life. It may be limited to one bone, or in some instances many bones may be involved. The cause of the disease is unknown, and the fact that it is not generalized suggests that it is probably not a result of a metabolic or endocrine disorder. The initial lesion is one of destruction by resorption. This is later followed by deposition of an excessive

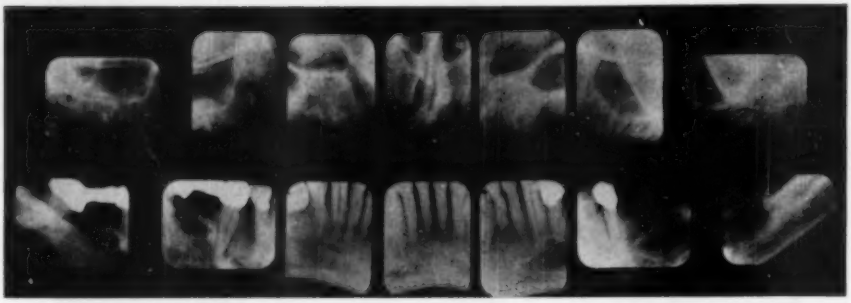

Fig. 11.—Multiple myeloma. There is extensive bilateral destruction of bone along the inferior border of the mandible and extending upward into the edentulous spaces

amount of bone of inferior quality to produce disfiguration and deformity. The jaws are involved in a relatively high percentage of cases. The incidence is greater in the maxilla than in the mandible, and in rare instances both jaws are involved.[27] The primary lesion may occur in the jaws. The roentgenographic appearance is dependent upon the stage at which the disease is seen. In the early or resorptive stage, evidence of the lesion is seen as a radiolucent region which has the appearance of a pseudocyst, which most often encroaches upon the roots of the teeth. As the disease progresses and deposition of bone takes place, there are regions of increased roentgenographic density presenting abnormal cancellous bone of a varied pattern. Because of the difference in degree of osteoclastic and osteoblastic activity, there are alternating areas of osteoporosis and sclerosis presenting a coarsely moth-eaten appearance. There is an absence of lamina dura in the involved regions.

In advanced stages a large deposition of poorly differentiated hyperplastic cementum may occur on the roots of the teeth in the involved regions. This form of cementum, which may be preceded by resorption of roots, has been described by Rushton.[28] This hypercementosis is pec-

27. Stafne, E. C., Paget's Disease Involving the Maxilla and the Mandible: Report of a Case. *J. O. S.* 4:114 (April) 1946.

28. Rushton, M. A., The Dental Tissues in Osteitis Deformans. *Guy's Hosp. Rep.* 88:163 (April) 1938.

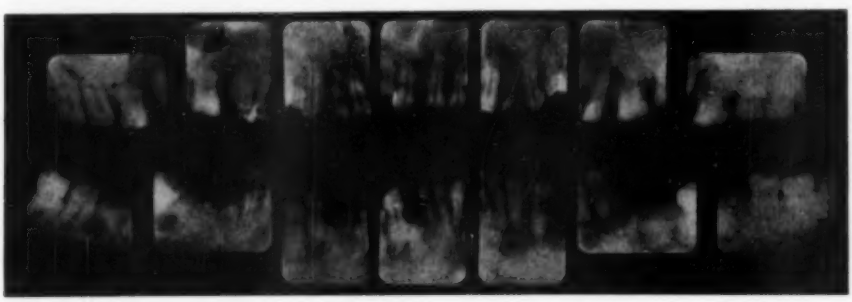

Fig. 12.—Paget's disease involving both jaws. There are alternating regions of osteoporosis and sclerosis of bone, and there is deposition of hyperplastic cementum on the roots of several teeth

uliar to Paget's disease and, when present, is of value not only in arriving at a diagnosis of Paget's disease but also in differentiating it from other osseous lesions which may involve the maxilla and mandible.

The dental roentgenograms in a case of Paget's disease involving both jaws in a patient 47 years of age show some of the characteristic roentgenologic features (Fig. 12).

Ectodermal Dysplasia

Ectodermal dysplasia is a disease of hereditary tendency characterized by scantiness or absence of sweat glands, partial or total absence of hair, faulty fingernails and partial or complete absence of teeth. The degree of involvement of the teeth, as well as of other ectodermal structures, probably depends upon the time of onset of the disturbance. If the disturbance occurs early in fetal life, there may be a complete absence of teeth; if in the latter part, the deciduous teeth may have formed, but a few or all of the permanent teeth may fail to develop. Of the permanent teeth, those for which the anlage is first laid down, that is, the first molars, incisors and cuspids, are most apt to remain unaffected.

One of the earliest cases of ectodermal dysplasia in which there was complete anodontia was reported by Guilford,[29] a dentist, in 1883. Thoma and Allen[30] reported a case of complete anodontia in a boy 5 years of age and a similar case was reported by Lovestedt[31] in a man 23 years of age. Because of failure of the teeth to form, the maxilla and mandible were underdeveloped and had the roentgenographic appearance of senile edentulous jaws in which the alveolar ridges had undergone extensive resorption. The case of a man 18 years of age who had only four permanent teeth was reported by Cook.[32] These were two maxillary cuspids and two maxillary molars.

The dental roentgenograms in Figure 13 were made of a boy 10 years of age. They revealed congenital absence of the maxillary lateral incisors and bicuspids, the mandibular central and lateral incisors, bicuspids and second molars. The permanent maxillary central incisors, the four cuspids and the first molars were present and undergoing normal development.

29. Guilford, S. H., A Dental Anomaly. *Den. Cosmos* 25:113 (Mar.) 1883.

30. Thoma, K. H., and Allen, F. W., Anodontia in Ectodermal Dysplasia. *Am. J. Orthodontics* 26:503 (May) 1940.

31. Lovestedt, S. A., Examples of Dental Dysplasia. *Am. J. Orthodontics (Oral Surg. Sect.)* 33:625 (Aug.) 1947.

32. Cook, T. J., Hereditary Ectodermal Dysplasia of the Anhidrotic Type. *Am. J. Orthodontics* 25:1008 (Oct.) 1939.

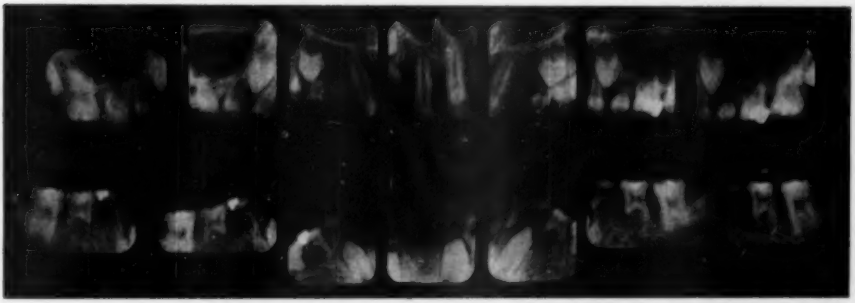

Fig. 13.—Ectodermal dysplasia. There is prolonged retention of six deciduous incisors, the canines and the molars, and congenital absence of permanent maxillary lateral incisors and premolars and of the mandibular incisors, premolars and second molars

Fig. 14.—Acrosclerosis. An abnormal increase in the width of the periodontal membrane space of the six left molars is evident. The space is fairly uniform in width and tends to surround the entire root

Physical examination revealed a scarcity of hair on the legs, arms and body, and a dry skin which was sensitive to sun and from which there was very little sweating. Slight defects were present in the fingernails. In this instance the onset of the ectodermal disturbance probably occurred late in fetal life as evidenced by the chronologic age at which dental development was interfered with and by the mild degree of ectodermal symptoms present.

Acrosclerosis

Acrosclerosis is a disease in which scleroderma involves chiefly the fingers, shoulder girdle, upper part of the thorax, face and sometimes the mucous membranes of the oral cavity. When the face is involved there may be inability to open the mouth normally. Acrosclerosis often is associated with Raynaud's disease.

A common dental roentgenographic finding, which appears to be peculiar only to patients suffering from acrosclerosis, is evidence of an abnormal increase in the width of the periodontal membrane space, which seems to have a predilection for the posterior teeth. The enlarged space which has been created is almost uniform in width, surrounds the entire root of the tooth and gives the appearance of a tooth which is being extruded rapidly from its socket. The increased size of the periodontal membrane space is created, however, at the expense of the alveolar socket. There is roentgenographic evidence of active resorption and destruction of the lamina dura. This is followed by sclerotic changes in the walls as evidenced by a wide radiopaque line which outlines the limits of the enlarged socket. Microscopic examination of the periodontal membrane reveals an increase in the number and size of the collagenous fibers and thickening of the walls of the vessel, which suggest changes similar to the cutaneous signs of the disease.[33]

Dental roentgenograms illustrating the typical widening of the periodontal membrane space about the left molar teeth of a woman 23 years of age are shown in

33. Stafne, E. C., and Austin, L. T., A Characteristic Dental Finding in Acrosclerosis and Diffuse Scleroderma. *Am. J. Orthodontics (Oral Surg. Sect.)* 30:25 (Jan.) 1944.

Figure 14. The periodontal membrane space about the molar teeth on the right showed similar changes.

Comment

The conditions referred to in this report by no means include all the oral manifestations of systemic disease that may be revealed by dental roentgenograms. Evidence of osteoporosis and necrosis caused by heavy metals such as arsenic, lead and radium may be present, and roentgenographic evidence of lesions of bone produced by syphilis, tuberculosis and conditions of obscure etiology such as polyostotic fibrous dysplasia are to be found in the jaws.

There is at present an enlarging field of opportunity for the dentist not only in the study, but also in rendering valuable service in the field, of general diagnosis. Other than medical clinics that have dental departments as part of their specialty services, an increasing number of hospitals now include among their department a hospital dental service. The dentist who is engaged in such service should not limit himself to treatment only, but should think more in terms of diagnosis, both general and dental. In diagnosis the general roentgenologist can be of invaluable aid, and full cooperation with him will prove to be of mutual benefit to both. Members of the dental staff of hospital dental services in hospitals that offer dental internships also have a teaching obligation which not only includes the teaching that concerns problems which are primarily dental, but must include attendance of and participation in meetings and conferences of the medical staffs of the hospitals.

A knowledge of the dental and osseous manifestations of systemic disease opens a field in dental roentgenology that is a broad and difficult one, and yet it is one in which addition of knowledge and further development are largely the responsibility of the dentist.

▲

Growth of Science.—When science began and man was discovering simple machines—like the wheel, the lever, the screw and the inclined plane—the only special tools required for research and development were a good pair of eyes and a knack for elemental reasoning.

During the industrial revolution, when scientists were developing electricity, steam power, chemistry and internal combustion, research required more tools and more knowledge: but seldom more tools than an inventor could afford; seldom more knowledge than he could acquire.

The doctor of the past operated and served his patient with his own skill, his own knowledge, and his own two hands. Nowadays he uses the service of the many hands—the specialist and the hospital. So it is in manufacture. In the past the ingenuity and skill of an individual could solve the immediate problem. Today the complexity and knowledge demands the cooperation of many minds, skills and techniques of the modern highly specialized research laboratory.—*Henry Butler Allen, "Introduction," The Franklin Institute Laboratories for Research and Development. Philadelphia: Franklin Institute, 1949.*

THE SOFTENING AND SOLUTION OF THE DENTIN IN CARIES

Milton B. Engel, D.D.S., M.S., Chicago

THE MATRICES or ground substances of dentin and enamel are largely carbohydrate-protein complexes. Some of the properties of these components and the details of their histogenesis were discussed in an earlier publication.[1]

Just before enamel formation the precursor of the ground substance of enamel appears in the ameloblasts. The enamel matrix of young animals contains a glycoprotein which is soluble in acid below pH values of 5.0. If this solubility persists in adult enamel the pathogenesis of enamel caries could be explained, in part, by solution of the ground substance under the plaque where acidity of around pH 4.7[2] has been recorded.

The precursor of the ground substance of dentin appears in the odontoblasts at the beginning of dentin formation as very minute glycoprotein granules. The dentin ground substance consists largely of a carbohydrate-protein complex which is assumed to be highly polymerized, as is the glycoprotein ground substance of bone and of connective tissues generally.[3, 4] It is believed that the glycoprotein ground substances are organized as aggregates of identical or similar molecules which are linked together to form polymers. It has been suggested by Gersh and Catchpole[3] that those substances which are less soluble in ordinary solvents and less reactive are most highly polymerized. When such aggregates are broken or depolymerized they become more soluble in water and their ability to react with other substances is enhanced.

Dentin matrix is not dissolved by mild acids or bases; however, there is some indication that swelling occurs at the extremes of the pH range 1 to 13. Stronger acids and bases will dissolve some or all components of the ground substance. There appears to be a progressive alteration in the physical state and in the reactivity of the ground substance with age. Thus young dentin is not so highly polymerized as old dentin. This difference may explain the greater resistance to caries with age.

In recent years a number of reports have appeared describing the activity of collagenase, an enzyme first demonstrated in *Clostridium welchii* toxin.[5-8] It has been shown that this enzyme depolymerizes the ground substance of connective tissues and bone.[3, 4]

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The Department of Orthodontia, University of Illinois College of Dentistry, and the Department of Pathology, University of Illinois College of Medicine, Chicago.

1. Engel, M. B., Glycogen and Carbohydrate-Protein Complex in Developing Teeth of the Rat. *J. D. Res.* 27:681 (Dec.) 1948.

2. Stephan, R. M., Hydrogen Ion Concentration of the Dental Plaque. *J. D. Res.* 17:251 (June) 1938.

3. Gersh, I., and Catchpole, H. R., The Organization of Ground Substance and Basement Membrane and Its Significance in Tissue Injury and Growth. *Am. J. Anat.* To be published.

4. Cobb, J., Calcification of Cartilage and Bone. In preparation.

5. MacFarlane, R. G., and MacLennan, J. D., The Toxaemia of Gas Gangrene. *Lancet* 2:328 (Sept. 13) 1945.

6. Robb-Smith, A. H. T., Tissue Changes Induced by Cl. Welchii Type A Filtrates. *Lancet* 2:362 (Sept. 22) 1945.

7. Oakley, C. L.; Warrack, G. H., and Van Heyningen, W. E., The Collagenase (*k* toxin) of Cl. Welchii Type A. *J. Path. & Bact.* 58:229 (April) 1946.

8. Bidwell, E., and Van Heyningen, W. E., The k Toxin (Collagenase) of Clostridium Welchii. *Biochem. J.* 42:140, 1948.

When the nature of dentin ground substance is considered these findings suggest an explanation for the changes which occur in that tissue in caries. The experiments described below show that the softening and solution of dentin is associated with changes in its reactivity which cannot be interpreted as due only to the action of acids. These chemical and physical changes are presumed to be evidence of depolymerization. Furthermore, collagenase and hyaluronidase-like activities have been demonstrated in carious dentin and it is believed that the dentin changes in caries are in part due to a "collagenase."

Material and General Methods

The tissues used in the study of the glycoprotein of the ground substance were obtained from young rats (1 to 16 days old), cats, rabbits and from man. Carious material was obtained from freshly extracted human teeth.

The freezing-drying method described by Gersh[9] was used for fixation. This procedure is carried out by freezing the tissue, immediately after removal, in isopentane which has been chilled in liquid air to approximately −150 C. The tissue is then dehydrated *in vacuo* at about −30 C. Protein denaturation is largely avoided and enzymatic activity is prevented. Shifts in organic and inorganic tissue components are minimized. The end result of this technic is to minimize certain morphologic and chemical artefacts.

Employing a recently described procedure for sectioning of hard tissues,[1] the tissues were infiltrated *in vacuo* with the chloroform soluble fraction of carnauba wax, a hard material; they were then embedded in this wax and sectioned at 6 to 10 microns. The sections were mounted on albumenized slides with finger pressure and the wax was removed with chloroform.

The highly specific periodic acid leucofuchsin method of Hotchkiss[10] was employed to demonstrate and localize polysaccharides and carbohydrate - protein complexes. The periodic acid acts on certain carbohydrates to cause a break in the linkage between adjacent carbon atoms bearing hydroxyl groups. These hydroxyl groups are oxidized to aldehydes. The section is then treated with Schiff's reagent (leuco-fuchsin), which produces a red staining reaction wherever the aldehydes are localized. Excess stain is removed in a sulfurous acid wash. Elimination of the preliminary periodic acid oxidation gives a check on the presence of free aldehydes. Polysaccharides, uronic acid derivatives, simple sugars, carbohydrate-lipoid complexes and carbohydrate-protein complexes are stained by this method. These substances may be differentiated by solubility differences. Thus simple sugars and uronic acid derivatives are removed by water. Glycogen can be identified by the failure of the red staining reaction to appear following incubation with saliva. Lipoids can be distinguished in a similar way by their solubility in methanol-chloroform. Red staining material remaining after these procedures and after preliminary denaturation in absolute alcohol is presumed to contain a carbohydrate-protein complex. This can be further characterized to a certain extent by solubility tests with buffers, extractives and enzymes.

The effects of depolymerizing enzymes on the tissues were determined by histochemical tests, physical methods and by nitrogen determinations on filtrates from dentin treated with collagenase. Extracts of carious dentin were assayed for depolymerizing activity by several methods which are discussed here.

9. Gersh, I., The Altmann Technique for Fixation by Drying While Freezing. *Anat. Rec.* 53:309 (Aug.) 1932.

10. Hotchkiss, R. D., A Microchemical Reaction Resulting in the Staining of Polysaccharide Structures in Fixed Tissue Preparations. *Arch. Biochem.* 16:131 (Jan.) 1948.

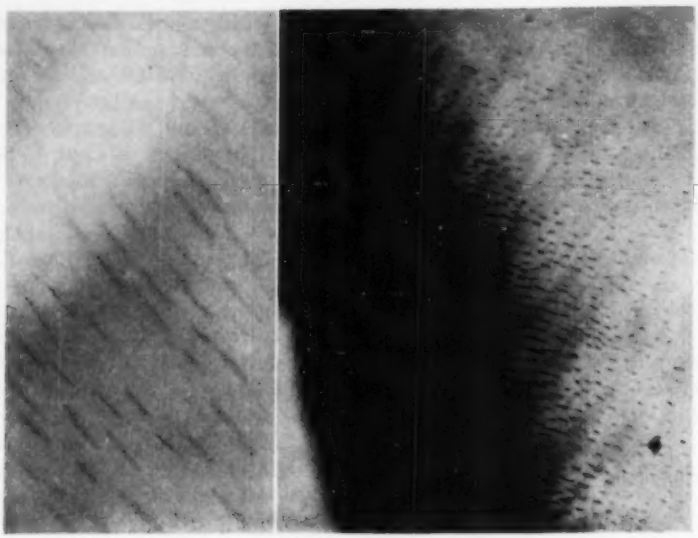

Fig. 1.—Left: Section of normal dentin which was decalcified in 2N hydrochloric acid for three days. The ground substance and dentinal fibers are only lightly stained. The latter are slightly swollen following the action of the acid. (× 830.) Right: Ground section of a tooth showing the difference in staining reactions of carious dentin and of normal dentin. The dense dark area is ground substance which has lost its morphologic characteristics. The adjacent dentin shows involvement of the tubules with early changes in the ground substance. The unstained area has not yet become carious. (× 170)

Experimental Procedures and Results

Histochemical Observations on Carious Dentin.—Sections of carious dentin were prepared by freezing and drying. A number of sections were also made by grinding. These were then stained for carbohydrate-protein complexes.

Earlier studies suggested that as dentin ages it becomes more highly polymerized. Adult dentin, unlike young dentin, does not react with the Hotchkiss reagents presumably because of its high degree of polymerization. Only light staining occurs after the routine acid decalcification procedure (Fig. 1, left). In the ground sections, the carious dentin appeared as intense red staining areas while the unaffected dentin was unstained (Fig. 1, right).

Details studied in microtome sections showed that the site of initial involvement was the dentinal fiber which stained a deep red. The tubules were enlarged to several times normal size and were filled with glycoprotein which was either swollen dentinal fiber or mucoid material possibly of bacterial origin (Fig. 2). Changes in the matrix surrounding the tubule occurred somewhat later. Initially, the ground substance stained pink. As the process progressed the intensity of the staining increased. Many foci of intensely staining matrix could be seen (Fig. 2, left). In some instances detailed examination of the matrix revealed a transition from an optically homogeneous structure to a fibrillar state, as though the latter were unmasked by the carious process. In advanced stages, the tissue lost its character-

istic morphology and appeared as a red staining mass (Figs. 1, right, and 2, right). In some preparations the ground substance had disappeared leaving remnants of the dentinal fiber, suggesting that this was a final phase of dentin solution.

While no systematic attempt was made to study the bacterial population of the lesion, many morphologic types were observed in the ground substance and in the tubules. These micro-organisms which contained carbohydrate-protein complexes were readily demonstrated by the Hotchkiss method. They included rods, cocci and threadlike forms.

The Effect of Depolymerizing Enzymes on Dentin.—Two depolymerizing enzymes, collagenase and testicular hyaluronidase, were used in this phase of the work. The latter depolymerizes hyaluronic acid, causing a rapid fall in its viscosity. Collagenase, the k toxin from *Clostridium welchii*,[7,8] is believed to depolymerize the carbohydrate-protein complex of the ground substance of connective tissue.[8] The collagenase was a component of *Cl. welchii* filtrate, which contained also θ toxin, hemolysin, lecithinase and hyaluronidase. These other factors have different activities from the k toxin enzyme, collagenase.

Sections of young rat teeth were incubated with 0.5 cc. of *Cl. welchii* toxin for periods up to seven days. Other sections were treated with heat inactivated enzyme and phosphate buffer at pH 7 for

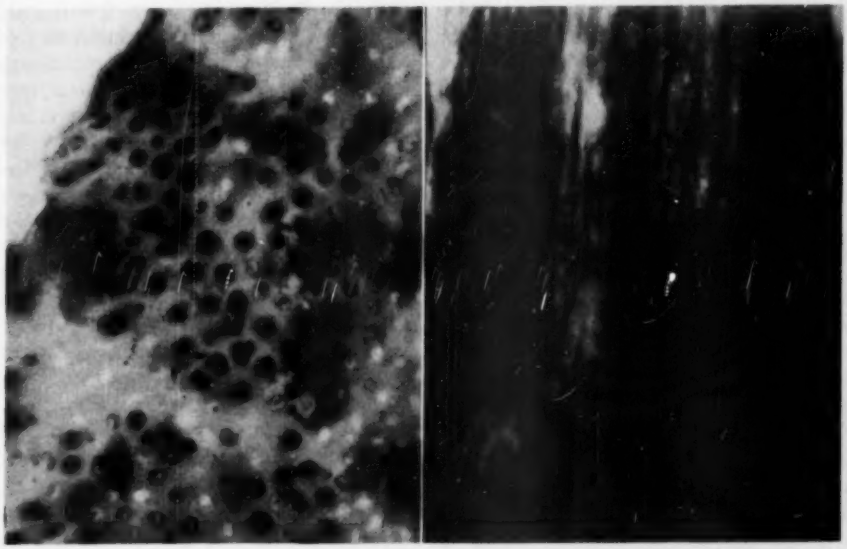

Fig. 2.—Left: Section of carious dentin which had been fixed by freezing-drying showing the tubules and dentinal fibers in cross section. Those tubules which are not carious appear clear and the contained dentinal fibers are seen as small black dots. Other tubules are enlarged and filled with deep staining glycoprotein masses which are believed to be the swollen dentinal fibers. The ground substance stains heavily in some areas and less brilliantly in others and this is presumed to be related to the degree of depolymerization. (× 560.) Right: Longitudinal view of section of carious dentin, fixed by freezing-drying, showing some tubules. The heavy staining is characteristic of an advanced degree of degradation of the glycoproteins of the dentin. (× 650)

Table 1.—Nitrogen determinations on filtrates of collagenase-treated dentin*

Preliminary treatment of dentin	Dentin incubated with 3 cc. collagenase for 10 days (mg.)	Total soluble N/cc. (mg.)	Increment of soluble N due to action of collagenase on dentin (mg./cc.)
No preliminary treatment	40.0	10.2	0.0
N HCl for 15 minutes	16.0	10.7	0.5
N HCl for 1 hour	10.0	11.5	1.3
N HCl for 6 hours	7.5	11.8	1.6
Clostridium welchii filtrate		10.2	
Acid treated dentin placed in phosphate buffer (no collagenase treatment)		0.1	

*The collagenase was contained in a *Clostridium welchii* filtrate.

control purposes. The most striking effect noted was solution of the predentin within 24 hours. The ground substance was affected before the dentinal fiber. The matrix also remained intact. Since there is no demonstrable lecithin in the predentin matrix and since sections incubated with hyaluronidase in concentrations up to 1 mg. per cubic centimeter (50 turbidity reducing units per milligram) show no change, the activity of the toxin is presumed to be due to the depolymerizing enzyme, collagenase.

In order to test the effect of collagenase on human teeth, slices of dentin were prepared and treated with N hydrochloric acid for varying periods. The acid served to decalcify the dentin and also partially to depolymerize it. The dentin was then treated with $\frac{M}{15}$ phosphate buffer at pH 6.2, washed with distilled water and then dried *in vacuo*. The sections were weighed and placed in measured quantities of *Cl. welchii* toxin to which 2 drops of toluol were added. A control tube containing buffer and toluol was also set up. The material was then incubated at 37 C. for one to two weeks.

Little or no change was noted in the tube containing undecalcified dentin. In the other tubes the initial reaction was an apparent swelling of the dentin, which became straw colored. The swollen sections disintegrated first to shreds, and then dissolved leaving only a few strands of debris. The longer the period of initial acid treatment the more rapid was the disintegration. The solution was then filtered and 0.5 cc. portions of the filtrate were assayed for total nitrogen by the Ma and Zuazaga modification of the Kjeldahl method. The data are summarized in Table 1 which shows that the greatest increment of soluble nitrogen was produced after six hours of treatment with N hydrochloric acid. Smaller quantities of nitrogen were noted after shorter periods of acid treatment; no nitrogen was liberated when the enzyme action was not preceded by contact with acid. Some degree of degradation of the dentin protein and decalcification must then be prerequisites for collagenase action.

Physical evidence of the action of collagenase on the dentin was obtained by recording the softening of decalcified dentin slices which had been placed in *Cl. welchii* toxin for varying periods extending to 144 hours. A ball tip under a constant weight of 10 Gm. was attached to a lever indicator and caused to rest on the surface of the dentin. Its gradual

penetration into the softening mass during the course of digestion caused a deflection of the indicator which was recorded on a kymograph. A curve plotted from such a record indicates that the softening occurred at a gradually accelerated rate (Fig. 3). The rate of softening could be increased by lengthening the time of preliminary exposure to the acid.

The collagenase treated tissues were sectioned and stained by the Hotchkiss method. Many of the reactions observed in carious dentin were seen here also. Although there were some differences these could be explained on the basis of difference in the mode of enzyme ingress to the tissue *in vivo* and *in vitro*. The peripheral areas were extremely red in their staining. The dentinal fibers stained sharply and appeared swollen. In areas of advanced changes the ground substance had dissolved, leaving the dentinal fibers behind (Fig. 4, left).

When sections of carious dentin which had no preliminary treatment were incubated with *Cl. welchii* toxin, a rapid alteration of the dentin was observed within a period of several hours. Sections in contact with the collagenase for periods longer than three hours began to disintegrate, and in 12 hours the carious dentin had completely disappeared. Histochemical examination of these preparations showed solution of the ground substance and increased intensity of staining reaction in some areas (Fig. 4, right). Undecalcified and undenatured normal dentin did not react in this manner.

These observations indicate that collagenase causes solution of the carbohydrate-protein complexes of dentin, presumably as a result of the depolymerization of these complexes.

Depolymerizing Enzyme Activity in Carious Dentin.—Masses of carious dentin were removed from recently extracted teeth which had been kept in the refrigerator. This material was concentrated by lyophilization. It was then ground in a mortar and suspended in $\frac{M}{10}$ phosphate buffer (pH 6.2) and extracted at 5 C. The filtrate, a cloudy solution, was used for assay of collagenase and hyaluronidase activity.

The filtrate was tested for depolymerizing activity with Azocoll, a hide powder preparation which has been diazotized with a red dye. This material liberates a red color when treated with collagenase.[7] The reaction is believed to result from the depolymerizing effect of the enzyme on the glycoprotein components of the ground substance contained in the hide powder.[3]

When 1 cc. of the carious dentin filtrate was incubated with 3 mg. of Azocoll in 2 cc. of $\frac{M}{10}$ phosphate buffer (pH 6.2) a red color developed in the supernatant fluid, indicating the presence of collagenase. The test became positive in 30 minutes to 72 hours depending upon the preliminary treatment of the filtrate. The results of a series of tests are summarized in Table 2.

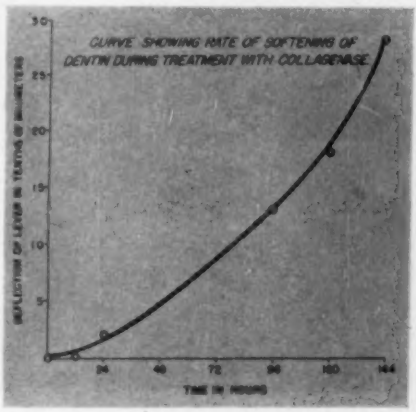

Fig. 3.—The curve shows the progressively accelerated softening of the dentin which has been treated with an excess of collagenase. The degree of penetration of the specimen was magnified approximately 5 times by the lever system

Variations in the rate of liberation of the dye appear to be associated with the ability of the micro-organisms from the carious material to proliferate and to liberate a depolymerizing enzyme. This interpretation is suggested by occasional absence of color when there has been preliminary treatment with toluol. The more rapid reaction observed in previously incubated filtrates reinforces such a conclusion.

Additional evidence of depolymerizing activity in carious material was obtained by histochemical methods. It has been shown by Gersh[11] that the mucinogen granules of the goblet cells of the rat duodenum contain a carbohydrate-protein complex which is removed by the action of collagenase. This material was used, therefore, as a test substrate for the caries filtrate. Sections of rat duodenum which had been prepared by freezing and drying were cut at 6 microns. They were then deparaffinized and treated with 0.5 cc. of filtrate to which 1 drop of 1:10,000 Merthiolate had been added to inhibit bacterial growth. Control sections were treated with material which had been heated to 100 C. for 10 minutes. After incubation at 37 C. for 12 hours, the sections were rinsed with distilled water and denatured in absolute alcohol. They were then stained for glycoprotein. Those preparations treated with active caries filtrate were characterized by the absence of goblet cell glycoprotein (Fig. 5). This confirms the presence of mucolytic activity resembling that of collagenase in carious dentin.

11. Gersh, I., Personal communication, 1948.

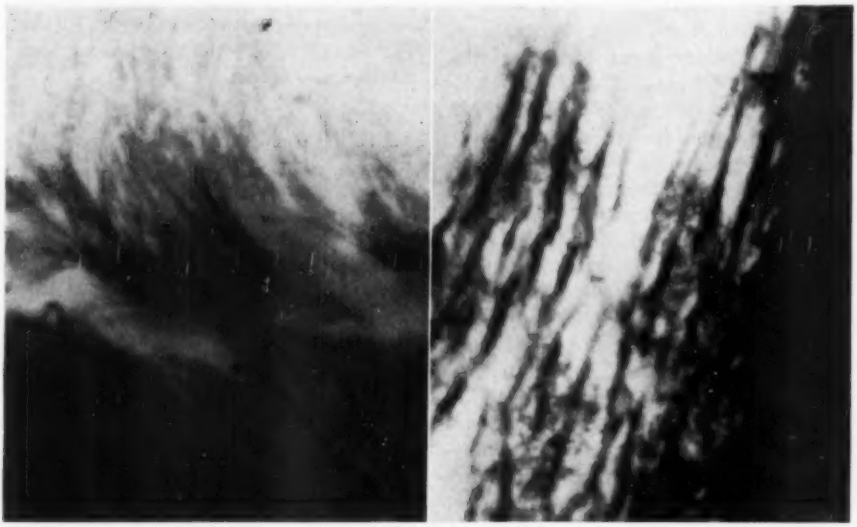

Fig. 4.—Left: Section of normal dentin which was decalcified in 2N hydrochloric acid for three days and then incubated with collagenase for 48 hours. The matrix stains deeply and the dentinal fibers appear swollen. The ground substance on the periphery has been dissolved leaving thread-like remnants which are the dentinal fibers. (× 1100.) Right: Section of carious dentin which had been treated with collagenase for six hours. The ground substance between the tubules has been largely dissolved. Remnants of the dentinal fibers and of ground substance remain. (× 830)

Table 2.—Reactions of Azocoll with filtrates of carious dentin

Preliminary treatment	Time required for color development
Caries filtrate incubated 24 hours without toluol, Azocoll then added	15 min.-1 hr.
Caries filtrate to which toluol and Azocoll were added immediately	48-96 hr. Sometimes reaction is negative
Azocoll and caries filtrate, no toluol	24-36 hr.

Further evidence was obtained when slices of previously decalcified dentin were incubated for periods of one to two weeks with the filtrate. There was initial darkening of the dentin, followed by softening and ultimate solution.

Hyaluronidase Activity.—The carious dentin extract was assayed for hyaluronidase by the viscosimetric method and by the biologic spreading reaction. A small quantity (0.1 cc.) of the filtered supernatant fluid was added to 1 cc. of 0.2 per cent sodium hyaluronate solution in $\frac{M}{10}$ phosphate buffer at pH 6.2. The viscosity changes were then determined in a viscosimeter which was maintained at a temperature of 37 C. in a water bath.

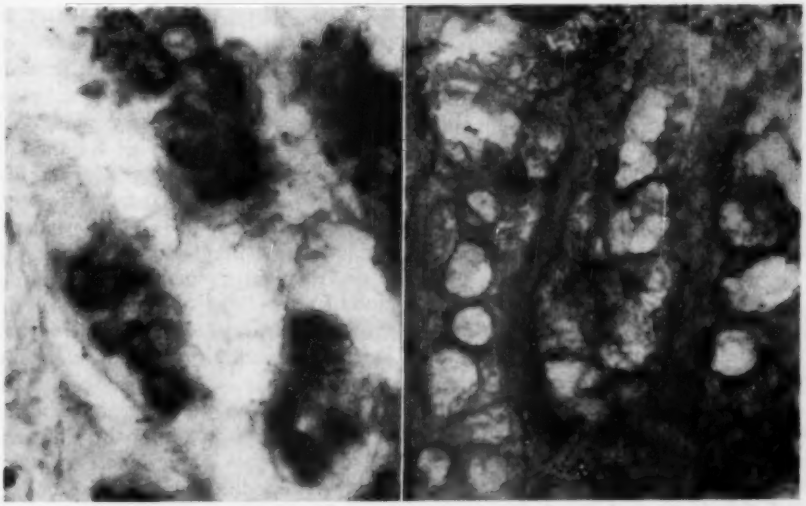

Fig. 5.—Left: This preparation was incubated with heat inactivated filtrate from carious dentin (pH 6.2) and then denatured in absolute alcohol. The dark staining globular masses are formed by the swollen mucinogen granules which are altered by prolonged treatment with the buffer. (× 560.) Right: This preparation was incubated with an active filtrate from carious dentin (pH 6.2) and then denatured in absolute alcohol. The areas formerly occupied by the goblet cell glycoprotein are now seen as clear circular spaces. The section contains masses of debris believed to be micro-organisms from the filtrate. (× 560)

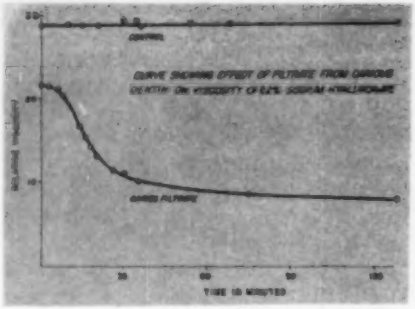

Fig. 6.—The change in viscosity of sodium hyaluronate shown here is not as rapid in its initial phase as that observed with known preparations of hyaluronidase. The reasons for this are not known. The difference in level of the control and experimental curves is due to a slight initial difference in the viscosity of the hyaluronate solutions

The drop in viscosity of the solution (Fig. 6) indicated the depolymerization of the hyaluronate by some factor in the carious dentin extract. There was considerable variation in the hyaluronidase activity as determined by the time required to attain half viscosity. This ranged from three minutes to approximately 12 hours. The reasons for this variation were not determined. Extract heated at 100 C. for 10 minutes failed to reduce the viscosity of the sodium hyaluronate solution. Intracutaneous injection of the extract together with India ink into a rabbit resulted in the typical spreading phenomenon described by Duran-Reynals,[12] and others. This reaction did not occur when material which had been inactivated by heating was injected.

Discussion

The classical concepts of the pathogenesis of dental caries were elaborated by Miller in 1890.[13] At that time he wrote: "dental decay is a chemico-parasitic process consisting of two distinctly marked stages: decalcification, or softening of the tissue, and dissolution of the softened residue." He postulated that bacterial "ferments" were partly responsible for the solution of dentin. Many of the conclusions which he reached remain valid today.

Histochemical studies of the carious dentin reveal changes in the glycoprotein of the ground substance in most striking fashion. It is thought that adult dentin does not react with the Hotchkiss stain because it is so highly polymerized and the micelles are so bound that the hydroxyl groups are not readily available for reaction with the reagents. The appearance of red-staining areas in carious dentin is believed to be a result of the release of these groups through the depolymerization of the carbohydrate-protein complexes. Such depolymerization, through the release of reducing substances, may be responsible for the clinically observed blackening of carious dentin which has been treated with silver nitrate. The reaction of carious dentin stained with hematoxylin and eosin which is described in the texts may be understood in the light of the proposal that ground substances which are depolymerized have an affinity for basic stains such as hematoxylin.[3]

The alteration of the ground substance is further emphasized by the difference in the reactions of carious dentin and normal unmodified dentin with collagenase. The latter required preliminary de-

12. Duran-Reynals, F., Tissue Permeability and the Spreading Factors in Infection; a Contribution to the Host-Parasite Problem. *Bact. Rev.* 6:197 (Dec.) 1942.

13. Miller, W. D., *Micro-Organisms of the Human Mouth*. Philadelphia: The S. S. White Dental Manufacturing Co., 1890.

calcification (and softening) before being dissolved by collagenase, while carious dentin was rapidly attacked without prior treatment with acid.

The reactions of the decalcified dentin with *Cl. welchii* toxin are caused primarily by the k toxin or collagenase component. This parallels the observations of Gersh and Catchpole[3] on connective tissue ground substance and of Cobb[4] on bone and cartilage. The progressive softening of the dentin and its altered reactivity following collagenase treatment are considered to be evidence of a depolymerization of the carbohydrate-protein ground substance. The Hotchkiss reaction of the collagenase treated dentin corresponds in its fundamental characteristics with that observed in carious dentin. These chemical and physical changes lend support to the thesis that a "collagenase" is in part responsible for the change of the ground substance in dentin caries.

Some preliminary preparation of the dentin appears necessary before it is affected by collagenase. This was shown by the differences in the amount of nitrogen released in the dentin slices treated with hydrochloric acid for varying periods of time. This initial alteration may be brought about *in vivo* by acids produced by oral bacteria. However, the action of bacterial acids alone does not adequately explain the changes which are observed in carious dentin.

The nature of the enzymes involved and the mechanisms of their action have received little attention by other investigators. Gottlieb[14] has referred to proteolytic factors but these have not been defined more specifically. Pincus[15] showed that cultures and filtrates of cultures from carious dentin may cause the solution of cartilage and bone when these tissues are incubated with the liquors for prolonged periods. These observations are suggestive since cartilage and bone can be depolymerized by collagenase. While Pincus did not discuss the identity of the active agents it is possible that depolymerizing enzymes resembling or related to collagenase may have been responsible for his observations.

Collagenase activity is not restricted to *Cl. welchii*. It has only recently been shown that oral forms depolymerize salivary mucins.[16] The observations reported here also suggest that enzymes of the mucolytic series, including collagenase, are elaborated by some of the oral bacteria.

Hyaluronidase, one of the "spreading factors," is produced by a number of the pathogens, and some of the streptococci are particularly active. The possible role of this latter group in dental caries has received greater attention recently.[17,18] The presence of hyaluronidase-like activity in carious dentin may be associated in part with streptococcal invasion. Hyaluronidase does not depolymerize dentin and apparently does not attack carious dentin. However, it is possible that a hyaluronic acid derivative may be one of the soluble terminal residues of the carbohydrate-protein complex of carious dentin. Such a substance could then serve as a substrate for hyaluronidase. In addition hyaluronidase probably enhances pulpal invasion by micro-organisms since this enzyme depolymerizes the hyaluronic acid component of the ground substance of connective tissue generally. The same result is noted when pulpal tissue of the rat is treated with the enzyme. The pulpal reaction in the terminal phases of caries may then be related to the hyaluronidase activity of the bacterial invaders.

14. Gottlieb, B., *Dental Caries*. Philadelphia: Lea & Febiger, 1947.

15. Pincus, P., Proteolysis of Cartilage and Bone. *Biochem. J.* 41:17, 1947.

16. Rogers, H. J., Bacterial Hydrolysis and Utilization of the Polysaccharide-Like Substances ("Mucin") in Saliva. *Nature* 161:815 (May) 1948.

17. Tunnicliff, R., and Hammond, C., New Streptococcus From Dental Caries. *Arch. Path.* 26:61 (July) 1938.

18. Harrison, R. W., Lactobacilli Versus Streptococci in the Etiology of Dental Caries. *J.A.D.A.* 37: 391 (Oct.) 1948.

Rogers[19] showed that the products of enzymatic depolymerization of hyaluronic acid stimulated further liberation of hyaluronidase by micro-organisms. The cleavage products of the salivary glycoproteins may act in a similar manner to cause the production of other mucolytic enzymes by the oral bacteria.

The observations reported here have certain clinical implications. It is known that caries of the deciduous teeth progresses more rapidly than that of the permanent teeth. Similarly, caries of the teeth of young individuals is a more rapid process than in older persons. We would explain this clinical observation on the basis of differences in the polymerization of deciduous and young dentin on one hand and permanent and older dentin on the other hand. The former, which is presumed to be less highly polymerized is, therefore, affected more rapidly by the collagenase-like activity of the bacteria and the carious process is more likely to develop into the rampant type. More highly polymerized adult or old dentin is not so readily attacked.

Demonstration of specific enzyme activity opens up the possibility of further investigation of enzyme inhibitors. Such an attack would permit a somewhat more direct approach to caries prophylaxis and therapy. Treatment of areas of carious dentin with a specific nontoxic inhibitor or antienzyme may offer a rational basis for a new type of therapeutics. The use of inhibitors or of antienzymes would also be an effective method of altering the bacterial flora and of interfering with the enzymatic adaptation of caries producing micro-organisms.

Conclusions

1. Fully differentiated dentin does not react with the periodic acid leuco-fuchsin reagent of Hotchkiss. However, dentin which is carious stains brilliantly.

2. Dentin which has been previously decalcified is depolymerized by an enzyme, collagenase. This is shown by (*a*) gradual softening and solution of the dentin; (*b*) increased soluble nitrogen in filtrates of an incubated dentin-collagenase mixture; (*c*) increased reactivity with the periodic acid leuco-fuchsin reagent.

3. Carious dentin has at least two depolymerizing activities which resemble collagenase and hyaluronidase. These enzymes are believed to be of bacterial origin.

4. Dentin caries is characterized by enzymatic depolymerization of the carbohydrate-protein complex(es) of the dentin resulting in swelling and the solution of the ground substance.

19. Rogers, H. J., Influence of Hydrolysates of Hyaluronate Upon Hyaluronidase Production by Micro-Organisms. *Biochem. J.* 40:583, 1946.

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Dangers of Bureaucracy.—A sweeping paralysis of thought, an acceptance of paternalistic measures from the government and the surrender of the individual citizen's own responsibilities could lead to a dictatorship in this country. . . . . If we allow this constant drift toward centralized bureaucratic government to continue, it will be expressed not only in the practice of laying down the rules and laws of governing each of us—our daily actions—to insure that we do not take unfair advantage of our comrades and other citizens, but finally it will be the actual field of operation. . . . There will be a swarming of bureaucrats over the land. Ownership of property will gradually drift into that central government and finally you have a dictatorship as the only means of operating such a huge and great organization.—*General Dwight Eisenhower, N. Y. Times, Feb. 13, 1949, quoted in North Carolina Med. J. 10:144, March 1949.*

DIAGNOSIS AND RECONSTRUCTION TECHNIC IN FULL MOUTH REHABILITATION

Kenneth A. Bignell, D.D.S., Chicago

One of the primary objectives of good dentistry is the maintenance of healthy teeth and their supporting structures. A great impediment to achieving this goal is malocclusion, which is responsible for the loss of teeth through trauma. It is also responsible for the resorption of the bony support ridges under both partial and full dentures. There are three ways of overcoming this handicap of malocclusion and securing a functional occlusal balance: by orthodontia, by grinding to eliminate the trauma caused by cusp interference, and by full mouth reconstruction. In this paper, we are chiefly interested in the discussion of the last of these methods; namely, full mouth reconstruction as it pertains to the securing of a functional occlusal balance.

To understand the problems involved in complete rehabilitation of the masticating mechanism, one requires a thorough knowledge of the associated dental sciences of anatomy, physiology, histology, biology and physics. The causes of the various conditions which are present must be recognized, as must be the limitation in the use of the three methods of treatment mentioned above. In order to secure the best results it is frequently necessary to combine orthodontics and grinding in cases in which full mouth reconstruction is being undertaken.

Full mouth reconstruction may be employed (1) when the patient has lost vertical dimension, (2) in cases in which restorative work is necessary although vertical dimension has not been lost, and (3) for purely cosmetic reasons. There are definite symptoms of lost vertical dimension, objective and subjective. The objective symptoms are plainly visible; teeth show attritional wear, there is a marked change in facial expressions upon swallowing, a sagittal displacement of the mandible in closure is apparent, or there may be found a deep overbite of the anterior teeth.

The subjective symptoms are pain or soreness in the mandibular joint, cracking noise in the joint, dizziness (frequently after eating), localized headaches, subluxation of the mandibular joint, and a burning sensation of the sides of the tongue. One of the chief causes of failure of so-called "bite opening" technics has been due to a disregard of the importance of maintaining a normal freeway space. "Freeway space" is a term which defines the space that exists between the teeth when the jaw is at the physiologic rest position. Niswonger[1, 2] first recognized that this physiologic rest position was constant throughout life. Thompson and Brodie[3] have confirmed his findings. Thompson[4] examined many cases in which the vertical dimension had been increased by means of full dentures but no allowance

1. Niswonger, M. E., The Rest Position of the Mandible and the Centric Relation. *J.A.D.A.*, 21: 1572 (Sept.) 1934.

2. Niswonger, M. E., Obtaining the Vertical Relation, *J.A.D.A. & D. Cos.*, 25:1842 (Nov.) 1938.

3. Thompson, J. R., and Brodie, A. G., Factors in Position of the Mandible. *J.A.D.A.*, 29:925 (June) 1942.

4. Thompson, J. R., The Rest Position of the Mandible and Its Significance to Dental Science. *J.A.D.A.*, 31:151 (Feb.) 1946.

had been made for the normal freeway space of two to three millimeters. Within a year after these cases had been made, they had closed until a normal freeway space was obtained with resultant trauma of the supporting structures.

There are two ways of measuring the physiologic rest position; the roentgenographic cephalometric method described by Broadbent, and the method first described by Niswonger and more recently by Holic. The Niswonger method does not entail the use of any elaborate equipment and can be readily done in any office; therefore its use is recommended. Measurements that have been made by the Niswonger method have been checked by the more elaborate roentgenographic method and have been found to be consistently accurate.

Holic,[5] in his recently published paper on centric registration, describes this method in detail which is summarized as follows:

The patient is seated erect in the chair without support to the head. With a soft lead pencil two dots are placed on the patient's face, one above the bridge of the nose and the other on the chin in the median sagittal plane. Phonetic and functional aids may be used to enable the patient to assume the physiologic rest position. The patient is instructed to say "M" or "Emma" slowly and then swallow, which action tends to bring the mandible back to the rest position. A draftman's calipers with a thumb-nut adjustment is used for measuring between the two dots, which dots should correspond in size to the diameter of the points of the calipers. Measurements should be taken at short intervals and recorded. When this measurement becomes identical for five or six times, one can be fairly sure that the correct physiologic rest position has been recorded. The patient is now instructed to close to centric position. This position is recorded. It is clear that the difference between these two measurements is the amount of the freeway space for that individual. Allowing a minimum of 2 mm., it is now possible to compute how much vertical dimension in centric position has been lost.

Maxwell[6, 7] in his treatise on ideal occlusion, propounded the theory that there were three spheres of equal radius involved in the arrangement and function of teeth; namely, the maxillary, mandibular and contact occluding spheres. He postulated that the maxillary teeth should be arranged in such a way that what he termed the "major cusps" would lie on the inner surface of a sphere, that the mandibular teeth should be arranged in such a way that the "major cusps" would lie on the outer surface of a sphere of equal radius. This would mean that the center of the mandibular sphere on which these teeth are arranged would be above and behind the center of the maxillary sphere. As the jaw would move in functional occlusion, the instantaneous contacts made by the teeth of the opposing jaws in the various functional occlusal ranges would constitute a third or contact occluding sphere. In order to secure the desirable condition under which continuous contact can be made in the functional occlusal ranges, it is necessary to have a proper correlation of cusp heights and angles.

Since the problem of occlusion is a three dimensional one, this correlation would have to be buccolingual as well as mesiodistal. In order to secure a functional balance, teeth should be arranged in such a way that each tooth can carry an equitable load, and continuous contacts must be made by all the teeth of the opposing jaws throughout the functional occluding ranges. Geometrically, there are only two arrangements which would

5. Holic, R., Centric Registration in Full Denture Construction, *J.A.D.A.*, 36:296 (March) 1948.

6. Maxwell, G. H., Biologic-Mathematical Formula for Ideal Occlusion, *J.A.D.A.*, 24:238 (Feb.) 1937.

7. Maxwell, G. H., Structural Functional Elements of Normal Occlusion, *Int. J. Orth. and Oral Surg.*, 23:1182 (Dec.) 1937.

permit continuous contact of superimposed surfaces; namely, two flat planes, or the concave and convex segments of spheres of equal radius. Mandibular movement being three-dimensional, it is necessary to adopt the spherical arrangement.

This is the ideal that Maxwell described and, although it is not found in the human race, it is only through an understanding of what constitutes the ideal that one can hope to approach it. Because of the malposition of teeth in mouths in which restorative work must be undertaken, a condition frequently exists which places teeth of the opposing jaws so that they cannot be restored to interdigitation correctly. In a large percentage of cases it is impossible to develop restorations using cusps without introducing interference. The technic described in this paper surmounts this difficulty by eliminating the anatomical cusps and restoring the occlusal surfaces with the frustum type of restoration as shown in Figure 1.

In the actual reconstruction work very little special equipment is necessary. One requires an articulator which is used as a hinge, and some glass templates. The articulator must be sturdy, have interchangeable bows and must have a flattened table to receive an anterior pinstop which can be securely locked. Glass templates of 4-, 5- and 6-inch radius, which can be made by an optical company, are true to one thousandth of an inch. These glass templates are used as masters from which stone replicas are developed for use in the laboratory or the mouth.

The technic of diagnosis and planning in a case in which lost vertical dimension is to be restored is as follows: Accurate impressions of the upper and lower dentures are secured and casts made in artificial stone. For the purpose of the preliminary survey, these casts are mounted to the patient's physiologic rest position. To do this, Holic's method for securing the vertical dimension at physiologic rest

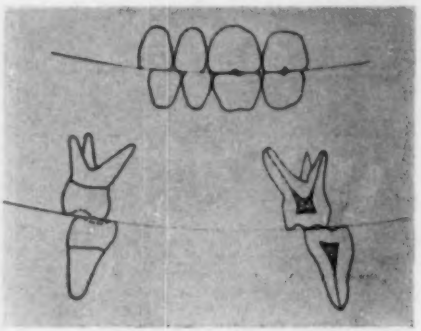

Fig. 1.—Anatomical cusps removed so that frustum rests on sphere

is employed, quick setting plaster of paris being injected between the teeth to register the relationship. When these plaster cores have set, they are removed, trimmed and used as bite guides to mount the casts on the instrument. When the plaster cores have been removed, the instrument can be closed 2 mm. in the anterior region, and the anterior pinstop locked securely to maintain the relationship. The space that now exists between the upper and lower casts represents the amount of lost vertical dimension that should be restored. A roll of softened baseplate wax is now placed upon the occlusal surfaces of the posterior teeth on each side of the lower cast and a greased template is pressed to position as shown in Figure 2. The wax is chilled and the template is removed. At this time cusps that protrude may be trimmed for better placing of the sphere. The wax is resoftened, pressed down again and rechilled. The amount of occlusal grinding will be determined largely by the type of malocclusion which exists. The problem is to enable the placing of the sphere within the prescribed area. After all this has been done, the template is removed and the upper cast brought down to make contact with it (Fig. 3). It becomes obvious that the upper left first molar is the chief offender in producing a greater opening

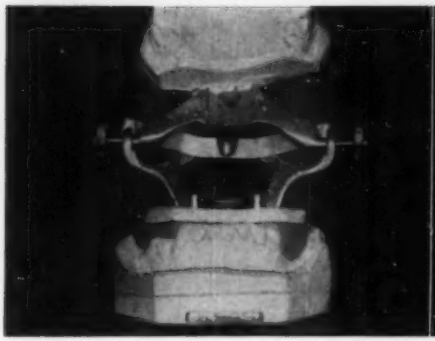

Fig. 2.—Roll of softened wax pressed to position over lower cast

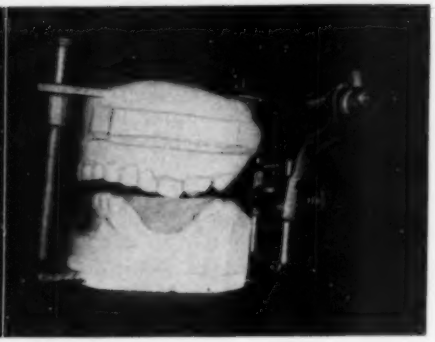

Fig. 3.—Upper cast closed against lower wax rim to observe cusp interference to this placing of the template

than is desirable. As much of this tooth as is practical may be cut away on the cast to reduce the amount of opening. Figure 4 is a view of the right side, showing the separation that existed which was caused by interference of the first molar on the opposite side. Figure 5 is a view of the upper left side after the first molar and the second bicuspid have been ground down. (See also Fig. 12 and 13.)

Some well softened wax is now molded over the posterior teeth of the upper cast which is then brought down in contact with the lower wax rim and chilled. The wax is then removed from the lower cast so that the contacts of the lower teeth with the upper wax rim may be observed. This operation may show how further cusp trimming of the lower teeth may be beneficial in making it possible to bring the casts closer together. By repeating this operation, eventually the most desirable position for placing the spheres may be found. Having located this position, the

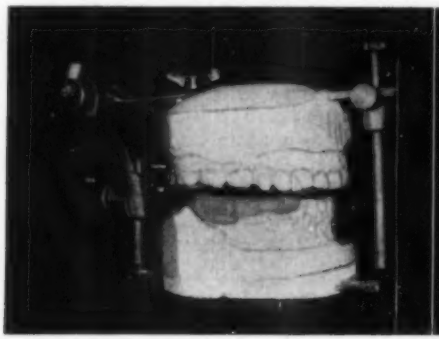

Fig. 4.—Showing no cusp interference on right side

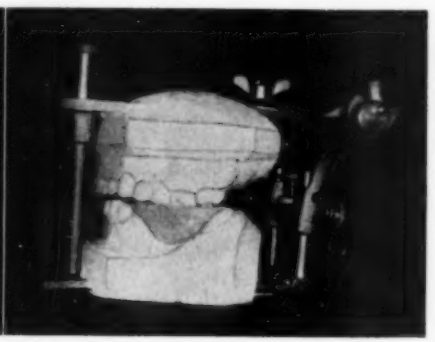

Fig. 5.—View of left side after upper first molar and second bicuspid have been ground

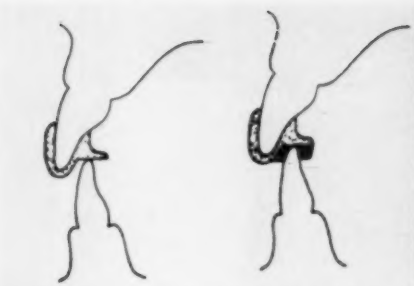

Fig. 6.—Sagittal cross section of anterior bite guide

Fig. 7.—Anterior bite guide with extension wires and modeling compound attached

preliminary diagnosis will have been completed. It must be kept in mind that the casts were closed on the instrument and therefore the relationship is not exactly that which exists in the mouth.

An attempt to complete the case to this mounting would bring error into the result. It is, therefore, necessary to make provisions for taking an "open position registration." This is accomplished by first constructing an anterior bite guide (Fig. 6). This bite guide, which can be constructed of a low fusing technic metal, is made to fit closely over the upper central incisors with a flat table extending lingually so that the lower incisors may rest on it. This flat table is developed to the anterior height that the preliminary diagnosis indicated. A wire is attached to this guide as shown in Figure 7. A piece of 16-gage wire is bent to conform to the lingual aspect of the upper arch and is attached securely to the lingual part of the anterior bite guide. Adhesive tape is attached to the looped ends of the extension wires to act as conveyors of modeling compound. This bite guide, with the extension wire to which modeling compound or wax has been added (Fig. 7), is now placed in the mouth and, the modeling compound having been softened previously, the patient is instructed to close in a normal retruded position. The bite is chilled and removed. The upper cast is removed from the instrument. The bite guide is placed in position on the lower cast, the upper cast is brought in contact with it and all are waxed securely together. The cast is now replastered to the upper bow. The anterior pinstop is dropped to contact the lower platform and locked securely. The casts are now mounted to a static opened relationship, similar to the manner in which edentulous cases are mounted. The secure locking of the anterior pinstop will avoid losing this definite relationship. It will be necessary at this time to make slight corrections in the placing of the sphere to allow for the difference between this mounting and the arbitrary opening that was made in the preliminary diagnosis.

Provision must now be made to do the same amount of cutting of teeth in the mouth that was done on the casts in the laboratory. To accomplish this, it is necessary to construct template guides. The following is the process for constructing these guides: Remove the upper cast from the instrument and place a stone template of the selected radius and wax it securely to the lower wax rim. Introduce an empty upper bow to the instrument and plaster the template to this bow (Fig. 8). After the plaster is set se-

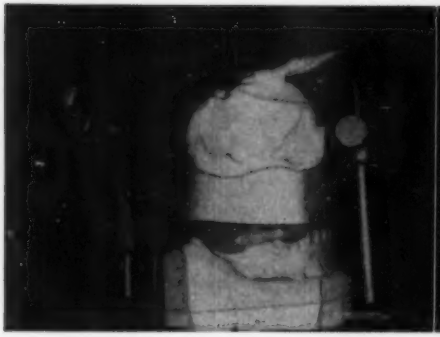

Fig. 8.—Stone template is plastered to empty upper bow to articulate with lower wax rim

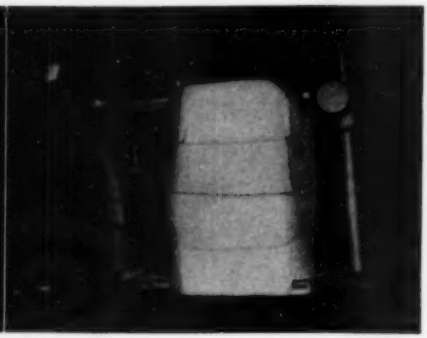

Fig. 9.—Lower template articulated to upper template

curely, lock the pinstop which must rest on the platform. Now remove the lower cast from the instrument and replace it with an empty bow. Place a concave template of the same radius as the upper in contact with the upper template and plaster this to a lower bow (Fig. 9). With these interchangeable mountings the wax patterns for the template guides may now be developed. Remove the lower bow with template and replace with the mounted lower cast. Now mold some softened wax over the posterior teeth or areas of the posterior teeth which have not been ground, and close instrument until the anterior pinstop is engaged on the table (Fig. 10). Connect the occlusal sections with a lingual bar. This pattern must be produced in a low fusible metal. To do this, a template made of investment material may be placed on and attached to the wax form, lifted from the cast and keyed, after which a counter may be poured. The wax is eliminated from the mold and a casting is made in low fusible metal.

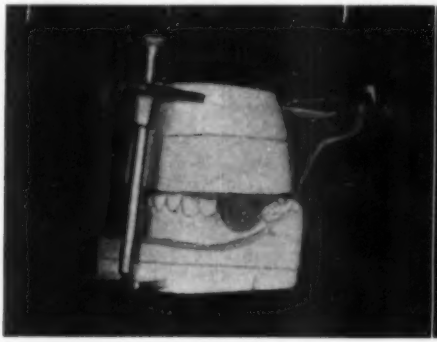

Fig. 10.—Wax pattern molded for lower template guide

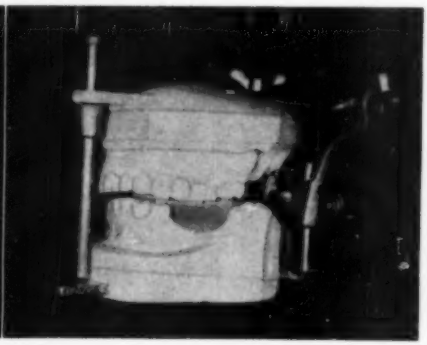

Fig. 11.—Finished metal templates in position on casts

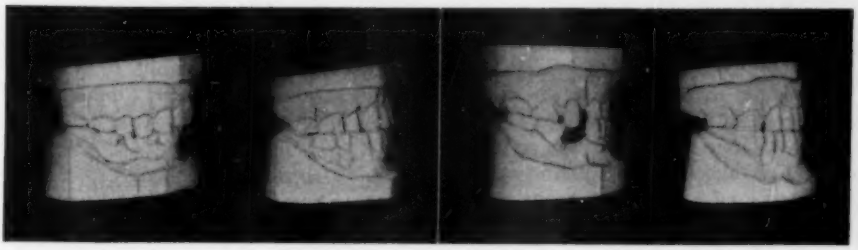

Fig. 12.—Left: Casts of case of patient wearing full upper denture against lingual bar lower. Cusp interference and lack of balance in functional occluding ranges resulted in severe trauma and destruction of the supporting tissues. Right: As rebuilt to sphere to secure equitable distribution in function with cusp interference eliminated

Fig. 13.—Left: An extreme case of cusp interference and attritional wear. Right: Mouth restored by individual tooth reconstruction. Cusp interference has been eliminated and a functional occlusal equilibrium secured

By the reverse process, an upper template guide is made. These guides (Fig. 11) are now placed on the casts, the instrument is closed and any irregularities that would keep the pinstop from engaging the lower platform are corrected. Place these template guides on the respective jaws. By using a stone template and a marking medium, it will be possible to locate the interfering cusps, all of which must be ground away until the templates can rest solidly on the template guides without rocking. With the template guides in place the patient should now be able to go through the various functional occluding movements and make continuous contacts between the two dentures.

If the procedure has checked up to this point, a reconstruction compatible with the diagnosis can be made without resorting to bites taken in the mouth, provided new impressions and casts are made and mounted to the templates in the laboratory.

Comment

If this technic is followed with care and precision it will achieve gratifying results for both dentist and patient.

1. The method of diagnosis employed makes it possible to observe how the finished case will look and function prior to commencing any actual restorative work in the mouth.

2. A desirable repositioning of the mandible in cases where there is condylar involvement is made possible. The spherical congruency to which the restorations have been made to conform permits the patients to acquire automatically a new and slightly advanced centric position, for the mandible will come forward to the most comfortable position. With cusp restorations this repositioning of the mandible must be more or less arbitrarily determined by the dentist, often with disastrous results.

3. Cusp interference with its resultant trauma is entirely eliminated.

4. An equitable distribution of force in the functional ranges of occlusion is obtained and a dynamic equilibrium is secured.

One must always bear in mind that there is no short cut to success and that no case of rehabilitation should be undertaken until a complete diagnosis has been made.

It is of vital importance that the measurement of the loss of vertical height in centric relation be determined from the physiologic rest position and not from the teeth in occlusion. Failure to provide a

normal freeway space may produce the subjective symptoms previously mentioned in cases where they were nonexistent and may perpetuate these symptoms in cases in which they did exist.

The technic which this paper advocates is neither new nor experimental.[8] It has been used with great success for the past fifteen years by a number of men who are convinced of its merits because of the satisfactory results that they have achieved and who highly recommend consideration of its use by others in the profession.—*25 E. Washington Street.*

8. Bignell, K. A., Diagnosis and Reconstruction Technic for the Treatment of Interarticular and Peridental Trauma and Disuse Atrophy. *J.A.D.A. & D. Cos.* 24:256 (Feb.) 1937.

CLINICAL AND MICROSCOPIC STUDY OF THE GINGIVAE IN PERIODONTOSIS

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A CLINICAL and histological picture of a noninflammatory disease of the supporting tissues of the teeth was described by Gottlieb[1] in 1923. He termed this condition "diffuse alveolar atrophy." Since then, only a few additional cases have been described in detail in the literature. The investigators[2, 3, 4, 5] seem to be agreed that the main characteristics of the disease in the early stages are atrophy of the alveolar bone and a widening of the periodontal membrane due to degeneration of its principal fibers. At this stage there is no inflammatory reaction in the gingivae. Later the pockets that form become excellent sites for the accumulation of food debris and calculus, and for the growth of micro-organisms. As a result of mechanical irritation and bacterial toxins, inflammation is initiated in the connective tissue and epithelium of the alveolar gingiva. This inflammation is considered a later secondary pathologic condition.

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This investigation was supported in part by a grant from the Division of Research Grants and Fellowships of the National Institutes of Health, U. S. Public Health Service, and in part by a grant from the Upjohn Company.

1. Gottlieb, B., Diffuse Atrophy of the Alveolar Bone. *Ztschr. f. Stomatol.* 21:195, 1923.

2. Orban, B., and Weinmann, J., Diffuse Atrophy of the Alveolar Bone. *J. Periodont.* 13:31 (Jan.) 1942.

3. Thoma, K. H., and Goldman, H. M., Wandering and Elongation of the Teeth and Pocket Formation in Paradontosis. *J.A.D.A.* 27:335 (March) 1940.

4. Becks, H., What Factors Determine the Early Stage of Paradontosis? *J.A.D.A.* 18:902 (May) 1931.

5. Kronfeld, R., and Mueller, E., A Case of Generalized Tooth Resorption. *Ztschr. f. Stomatol.* 29:276 (March) 1931.

Table 1.—Histologic appearance of clinically normal gingival papillae

Case no.	Sex and age	Epithelium								Subepithelium					Opposite gingival pocket	
		Stratum corneum	Stratum granulosum	Hydropic degeneration of stratum spinosum	Intercellular edema of stratum spinosum	Peg elongation	Mitosis in stratum germinativum	Pearl formation	Cellular infiltration through basal cell layer	Collagen	Edema	Vessel dilatation	Degree of cellular infiltration	Type of cells	Degree of cellular infiltration	Type of cells
201	F22	−	0	0	0	0	0	0	+	0	0	+	+	ABC	+	ABC
202	F20	0	0	0	0	0	0	0	+	0	+	+	0	ABC	+	AC
203	F23	±	±	+	0	0	0	+	+	0	+	+	0	AB	+	AB
204	M21	0	0	+	0	0	0	0	+	±	+	0	++	AB	++	AC
205	M23	0	0	0	0	0	0	+	+	0	0	0	0	AB	0	AB
206	M20	0	0	0	0	+	+	0	0	0	+	+	+	AB	+	ABC
207	M21	0	0	+	+	+	0	0	+	0	+	+	+	AC	+	AC
208	M21	+	0	0	0	+	+	0	0	0	+	0	+	ABC	+	ABC
209	M22	+	0	0	0	+	++	0	0	0	+	0	+	ABC	+	AC
210	M22	0	0	0	0	+	+	0	+	0	+	+	+	ABC	+	ABC
211	M23	0	0	+	0	+	0	0	0	±	0	+	+	ABC	++	ABC
212	M20	0	0	0	0	+	0	0	+	±	+	0	0	ABC	+	AC
213	M21	0	0	0	0	0	0	0	0	0	+	+	+	ABC	+	ABC
214	M20	+	0	0	0	+	+	0	0	0	+	+	+	ABC	+	ABC
215	M22	+	0	+	0	+	0	0	0	+	+	0	+	ABC	+	ABC
216	M21	+	0	0	+	+	0	0	0	0	0	0	0	AB	0	AB
217	M23	+	0	0	0	+	0	0	0	0	0	0	+	AB	+	AB

− = Absent
0 = Normal
± = Present, but less than normal
+ = Slight increase
++ = Moderate increase
A = Lymphocytes
B = Plasma cells
C = Polymorphonuclear leukocytes

The present report deals with the results of a clinical and roentgenographic examination of the teeth and their supporting structures, and a microscopic study of the gingivae, in various stages of periodontosis—a condition which appears

to be similar to diffuse alveolar atrophy. It describes one phase of a detailed study to determine the etiology of this disease.

Patients were selected from the dental clinic. They included (1) young individuals whose roentgenograms showed signs of alveolar bone loss, (2) patients in whose mouths local factors which could account for the loss of alveolar bone did not exist, and (3) patients whose condition did not improve in spite of continued periodontal treatment.

Twenty-eight cases ranging in age from 14 to 45 years were given complete dental examinations. Sixteen of the 17 subjects who were 32 years of age or under were females. This confirms our previous experience that periodontosis, when it is found at an early age, is predominantly among females.[6,7]

The dental examination included a full mouth series of roentgenograms, kodachrome photographs of the gingivae, measurement of the depth of the pockets

6. Tenenbaum, B., and Karshan, M., Blood Studies in Periodontoclasia. *J.A.D.A.* 32:1372 (Nov.) 1945.

7. Karshan, M.; Tenenbaum, B.; Karlan, F. R., and Leonard, H. J., Blood Studies in Periodontoclasia II. *J. D. Res.* 25:247 (Aug.) 1946.

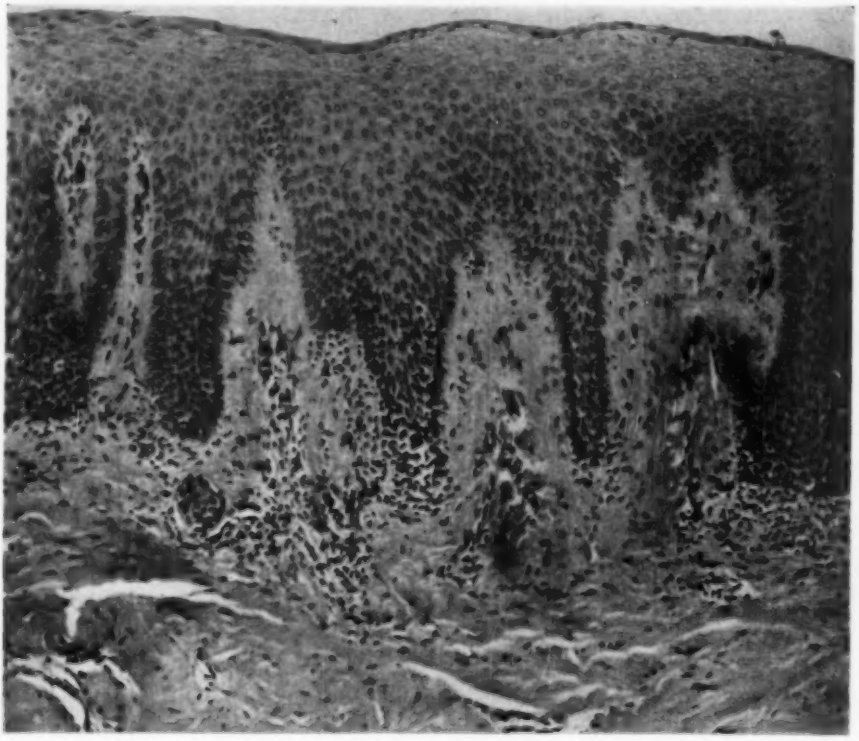

Fig. 1.—Case 201: female, age 22. The epithelium on the surface is parakeratotic. Inflammatory cells, such as lymphocytes and plasma cells, are infiltrating through a small section of the rete pegs. In the reticular layer some of the vessels are dilated and a moderate inflammatory reaction is present throughout. (Hematoxylin and eosin; × 165)

around each tooth, alginate impressions for study models and a biopsy of the interdental gingival papilla between the upper left cuspid and first bicuspid teeth.

Control Group

The control group consisted of 17 individuals 20 to 25 years of age who were free from all clinical evidences of periodontal disease. Gingival biopsies between the upper left cuspid and bicuspid teeth were studied.

Clinical Examination.—This group presented normal appearing gingivae characterized by firm and pointed papillae, pink in color and stippled. There was no exudate present, and the gingival sulci were shallow.

Histologic Examination.—The histologic appearance of the gingivae of the control group is summarized in Table 1. Hydropic degeneration was observed in the epithelium in five of the individuals. Acanthosis with peg elongation occurred

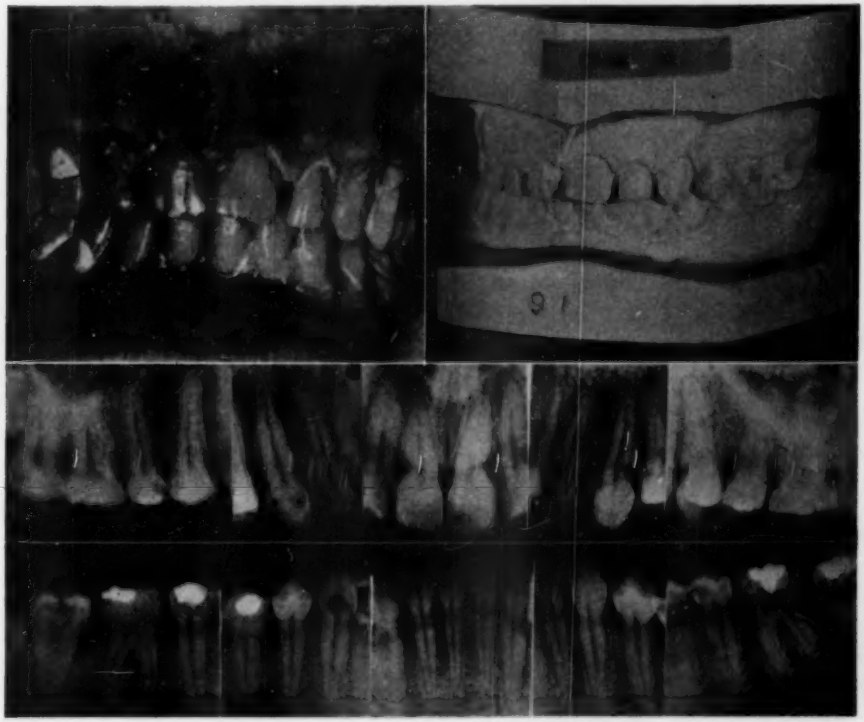

Fig. 2.—Case 91, female, age 14. Above, left: The gingiva is pink, firm and stippled with the exception of an area around the mandibular central incisors which appears glossy. No edema or recession is evident. Above, right: The occlusal relationship is normal but there is labial protrusion of the maxillary left central incisor. The contacts are open between all the upper anterior teeth. Below: There is beginning of bone loss in the form of an arc from the mesial surfaces of the mandibular second molars to the distal surfaces of the second bicuspids. The alveolar crest has been thinned around several teeth

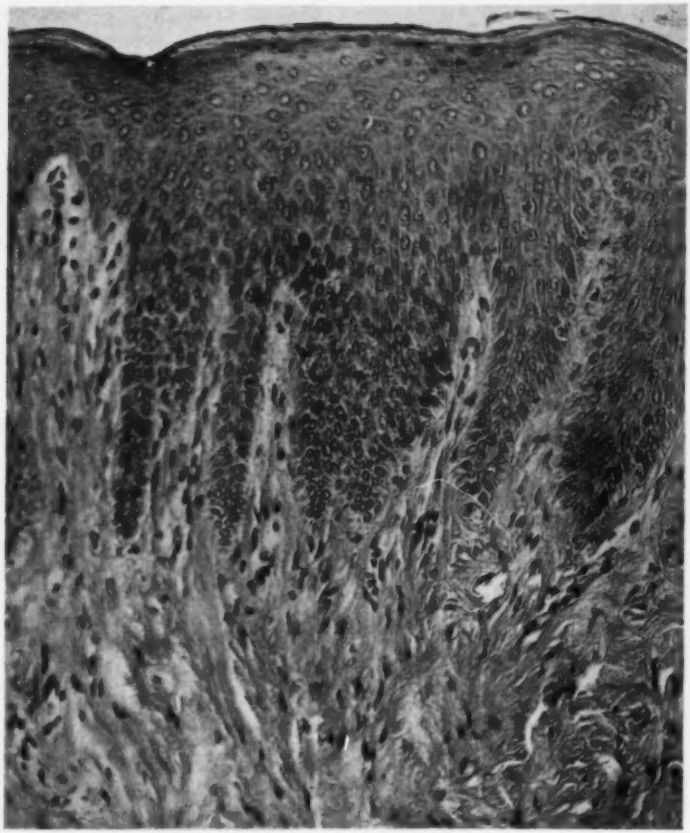

Fig. 3.—Case 91. The epithelium has a distinct surface keratin layer. The epithelial cells are compact without edema. The basal cell layer is intact. In the reticular layer there are heavy strands of collagen fibers, fibroblasts, lymph and blood vessels and a minimal number of round and plasma cells. (Hematoxylin and eosin; × 210)

in 11 instances along with numerous mitotic figures in the stratum germinativum in five of them. Pearl formation was seen in two cases. Chronic inflammatory cells such as lymphocytes and plasma cells infiltrated through a small area of the basal cell layer in 8 of the cases. The lamina propria consisted of white collagenous fibers, fibroblasts, blood and lymph vessels, and relatively few inflammatory cells in all sections. In the reticular layer, slight edema was present in 12 cases and vessel dilatation was observed in 9. Five cases showed a relatively small number of lymphocytes and plasma cells. In the remaining cases there was a moderate number of these cells and a few scattered polymorphonuclear leukocytes which were increased greatly opposite the gingival sulcus. It is thus clear, as stated

by Hill,[8] that "the definition of a normal gingiva is not easily made. . . . It is rare indeed that a specimen, obtained from adults having apparently normal mouths, is free from some form of inflammatory disturbance or epithelial erosion." A section of a typical case in this group is shown in Figure 1.

Periodontosis Group

From the results of microscopic examination of the gingivae, the periodontosis cases can be divided into those with (1) little, (2) moderate, and (3) heavy cellular infiltration into the subepithelial connective tissue.

Group I

Clinical and Roentgenographic Examination.—The gingivae appeared pink and stippled, but there was a slight erythema of the interdental papilla in several areas in 6 of the 8 cases. Little or no calculus was present. A diagnostic sign was the migration of the maxillary or mandibular incisors with resulting diastemata.

Roentgenographic examination revealed loss of alveolar bone that generally conformed to a definite pattern. The bone loss usually extended in an arc from

8. Hill, T. H., A Text Book of Oral Pathology, ed. 3, Philadelphia: Lea and Febiger, 1945, p. 313.

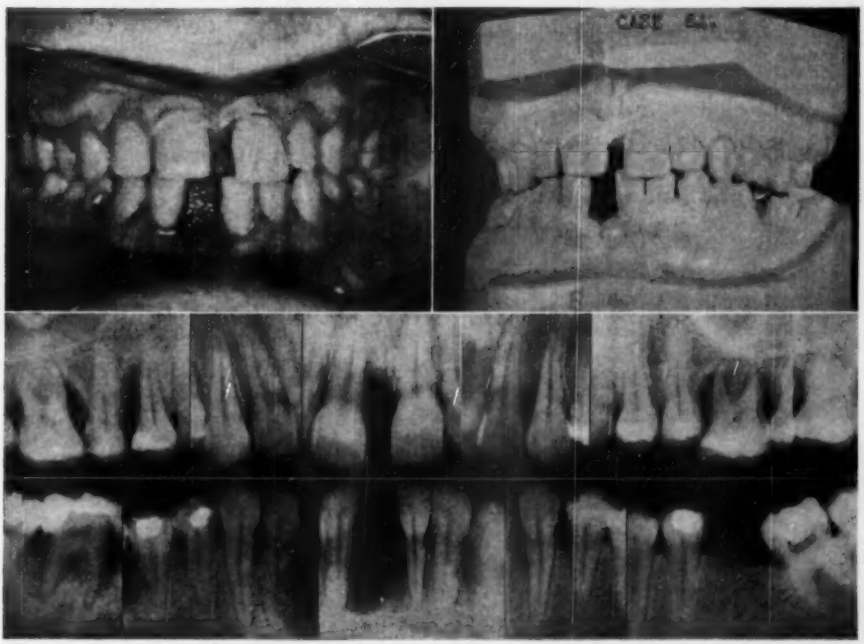

Fig. 4.—Case 84: female, age 18. Above, left: The lower right central was exfoliated several days before photograph was taken. The gingivae appear normal except for area around missing tooth. Above, right: There is an elongation and slight labial protraction of the maxillary right central incisor. There are open contacts between several anterior teeth. Below: There is marked loss of alveolar bone in the first molar area. There is also loss of alveolar bone around the incisor teeth that have migrated

the mesial surfaces of the second molars to the distal surfaces of the second bicuspids. There was also loss of alveolar bone around the incisor teeth that had migrated. In many areas there was a thinning of the alveolar crest. More alveolar bone was present about the bicuspid teeth in both arches, especially the mandible. These observations were rather constant in this group in individuals under 25 years of age. The disease progressed and alveolar bone was lost in spite of the lack of inflammatory reaction in the gingivae. The progress of the disease in this group is shown in Figures 2 to 4.

Histologic Examination.—The histologic appearance of gingival papillae in periodontosis with little cellular infiltration is summarized in Table 2. The epithelium had a distinct keratin layer. The epithelial cells were compact without cellular proliferation or edema with the exception of one case in which hydropic degeneration was observed only at the tip of the free gingiva. The basal cell layer was intact. The corium consisted of heavy strands of collagen fibers, fibroblasts, lymph and blood vessels and a minimal number of lymphocytes and plasma cells. Opposite the gingival sulcus, these cells became more numerous, and in three of

Table 2.—Histologic appearance of gingival papillae in periodontosis with little cellular infiltration

Case no.	Sex and age	Epithelium								Subepithelium					Opposite gingival pocket	
		Stratum corneum	Stratum granulosum	Hydropic degeneration of stratum spinosum	Intercellular edema of stratum spinosum	Peg elongation	Mitosis in stratum germinativum	Pearl formation	Cellular infiltration through basal cell layer	Collagen	Edema	Vessel dilatation	Degree of cellular infiltration	Type of cells	Degree of cellular infiltration	Type of cells
91	F14	0	0	0	0	0	0	0	−	0	+	+	±	AB	±	AB
84	F18	0	0	0	0	0	+	0	−	0	+	0	±	AB	+	ABC
58	F18	0	0	+	0	0	0	0	−	0	0	+	±	AB	+	ABC
74	F24	+	0	0	0	0	0	0	−	0	0	0	−		+	AB
94	F30	0	0	0	0	0	0	0	0	0	0	0	±	AB	+	ABC
44	F32	0	0	0	0	0	+	0	−	0	+	0	±	AB	±	AB
80	F32	0	0	0	0	0	0	0	0	0	+	0	±	AB	±	AB
63	F47	0	0	0	0	+	0	0	−	0	+	0	−		0	AB

− = Absent
0 = Normal
± = Present, but less than normal

+ = Slight increase
A = Lymphocytes
B = Plasma cells
C = Polymorphonuclear leukocytes

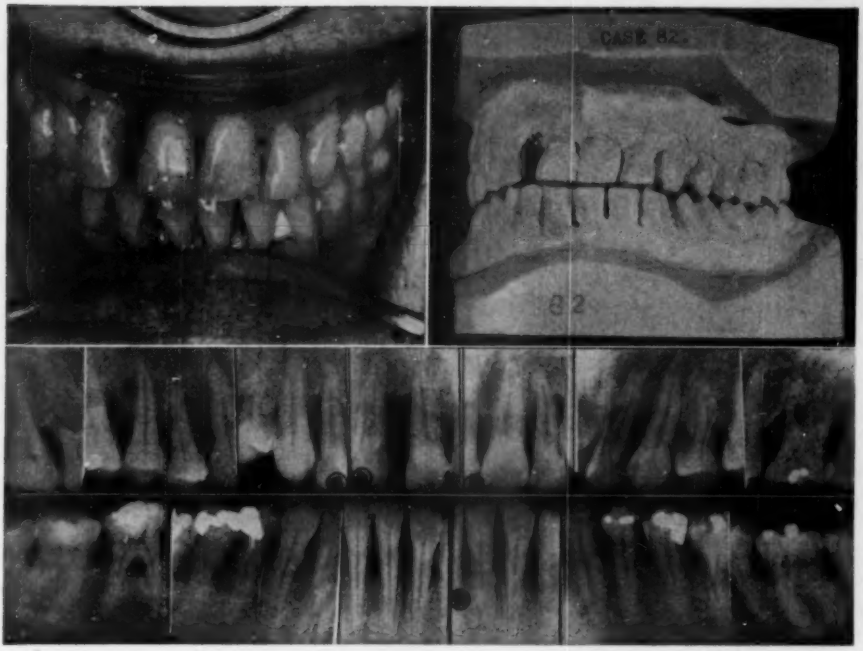

Fig. 5.—Case 82: female, age 36. Above, left: The gingivae appear pink and firm except around the lower anterior teeth. There is a separation between the maxillary right lateral and central incisors. Gingival recession is present around the anterior teeth. Above, right: Due to movement of teeth, normal occlusal relationship is lost. Below: There is marked alveolar bone loss in the maxilla and a moderate loss in the mandible. More alveolar bone is present around the bicuspids, especially in the mandible, than in any other area. This pattern of bone loss is generally associated with periodontosis in adolescence or early maturity

the cases a few scattered polymorphonuclear leukocytes were observed (Fig. 3).

Group 2

Clinical and Roentgenographic Examination.—Calculous deposits were present in nine of the eleven cases. The gingivae were generally pink, but in some areas there was a definite change to deep red and purple and the assumption of a glossy appearance. With the exception of the above areas where the papillae lost their stippling and were blunted, the gingivae as a whole were normal in appearance. In 7 cases a slight serous exudate was observed upon finger pressure against the affected papillae.

Roentgenographically these patients presented a pattern of alveolar bone loss similar to the first group but more advanced. A typical case in this group is shown in Figure 5.

Histologic Examination.—The histologic appearance of the gingival papillae in periodontosis with moderate cellular infiltration is summarized in Table 3. The histologic picture in the epithelium in this group was very similar to that in the

Table 3.—Histologic appearance of gingival papillae in periodontosis with moderate cellular infiltration

Case no.	Sex and age	Epithelium								Subepithelium					Opposite gingival pocket	
		Stratum corneum	Stratum granulosum	Hydropic degeneration of stratum spinosum	Intercellular edema of stratum spinosum	Peg elongation	Mitosis in stratum germinativum	Pearl formation	Cellular infiltration through basal cell layer	Collagen	Edema	Vessel dilatation	Degree of cellular infiltration	Type of cells	Degree of cellular infiltration	Type of cells
46	F17	0	±	++	+	0	0	+	0	0	+	0	+	ABC	+	ABC
96	M25	0	0	+	+	+	+	0	0	0	+	+	+	ABC	++	ABC
65	F29	0	0	0	0	+	+	0	0	0	0	0	+	ABC	+	ABC
72	F29	0	0	0	0	0	0	0	0	±	++	+	+	AB	++	ABC
83	F30	0	0	0	0	0	0	0	0	±	+	0	0	AB	+	ABC
61	F32	0	0	0	0	±	+	+	0	0	0	+	+	ABC	+	ABC
76	F33	±	0	0	+	+	0	+	0	0	0	0	0	AB	++	ABC
70	M33	+	+	0	0	+	0	0	0	0	++	+	+	AB	+	AB
49	M35	0	0	+	0	0	0	0	0	0	+	0	+	AB	+	AB
82	F36	0	0	0	0	0	0	0	0	0	0	+	+	ABC	+	ABC
67	F37	0	0	+	0	+	0	0	0	0	+	+	0	AB	++	ABC

– = Absent
0 = Normal
± = Present, but less than normal
+ = Slight increase
++ = Moderate increase
A = Lymphocytes
B = Plasma cells
C = Polymorphonuclear leukocytes

control group. The type and amount of cellular infiltration into the reticular layer with the corresponding increase opposite the gingival sulcus were also very similar. A typical section in this group is shown in Figure 6.

Group 3

Clinical and Roentgenographic Examination.—The patients in this group were in an advanced stage of the disease and some denture service was necessary in each case. The gingivae were red and the papillae had a purplish tinge. No stippling was present and the papillae had lost their firmness and appeared glossy and spongy. Many of the teeth showed second and third degree mobility.

In the roentgenograms of this group the pattern of alveolar bone loss described for Group 1 was absent because of an

Fig. 6.—Case 82. There is moderate inflammatory response in the subepithelium. Several dilated vessels are present in this area. The basal cell layer remained intact. There are no changes in the epithelium. (Hematoxylin and eosin; × 125)

almost complete breakdown of the alveolar process. However, relatively more alveolar bone remained around the mandibular bicuspid teeth. A typical case in this group is shown in Figure 7.

Histologic Examination.—The histologic appearance of the gingival papillae in periodontosis with heavy cellular infiltration is summarized in Table 4. The epithelial changes in this group were essentially similar to those in the normal group. In the reticular layer, however, there was marked cellular infiltration with a corresponding reduction in the amount of the connective tissue. In many areas, small blood vessels were filled with a fibrinous clot because of thrombosis. The inflammatory cells consisted mainly of lymphocyte and plasma cells. Opposite the gingival pocket, almost the entire connective tissue was filled with acute inflammatory cells. The capillaries were dilated and filled with numerous polymorphonuclear leukocytes. The basal cell layer opposite the ulcerated area was generally broken and inflammatory cells were present in the epithelium. A typical

section in this group is shown in Figure 8.

Epithelial conditions such as peg elongation and pearl formation were found in some of the normal and periodontosis cases. Plasma cells were found consistently in all groups.

Conclusions

Periodontosis is a disease that occurs predominantly in females during adolescence and early maturity. In the early stages, the clinical appearance of the gingivae is normal. Movement of the maxillary or mandibular incisors with resulting diastemata is often the first clinical symptom. As the disease progresses the gingivae retain their normal appearance, and the maxillary incisors become elongated and protrude labially so that the cementum is exposed. Since bone is lost and the teeth move at a relatively early age, local factors are introduced—such as open contacts, food impaction areas, traumatic occlusion, calculus and bacterial accumulations—which aggravate the condition, causing inflammation and further loss of the supporting tissues.

Roentgenographic examination of adolescent patients in this study revealed a loss of alveolar bone that generally con-

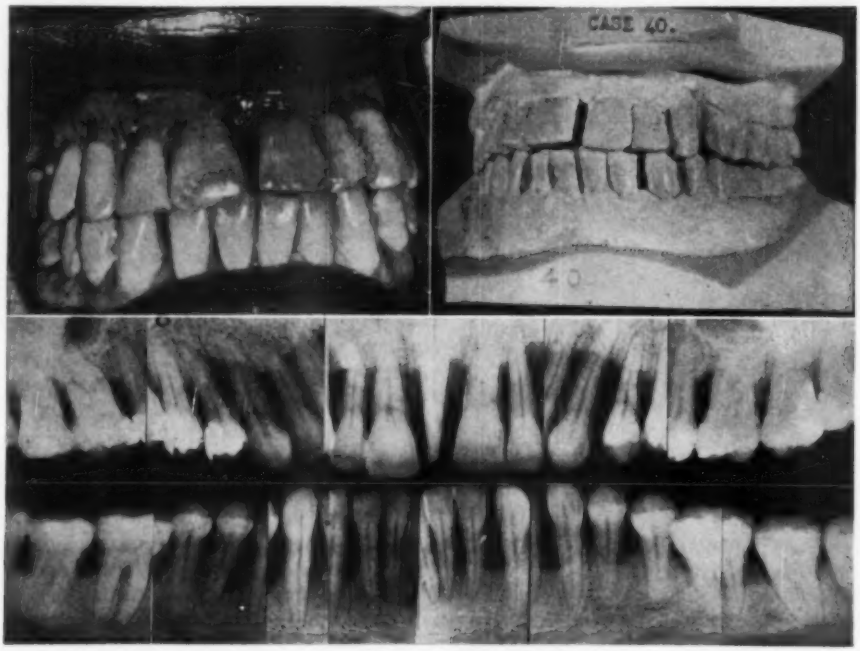

Fig. 7.—Case 40: female, age 32. Above, left: The gingivae are glossy without stippling and have a bluish tinge. The papillae are blunt. Recession of the gingivae is marked especially in the maxillary cuspid regions. Above, right: Diastemata are present between many of the anterior teeth. The upper right central incisor is in labioversion. As in Fig. 5, normal occlusal relationship is lost because of movement of teeth. Below: There is an almost complete loss of alveolar bone in both arches with the exception of the mandibular bicuspid area

formed to a definite pattern. This consisted of an arc of bone loss from the mesial surfaces of the second molars to the distal surfaces of the second bicuspids. There was loss of alveolar bone around the incisor teeth that had migrated. The alveolar bone crest showed a thinning in many areas. Alveolar bone about the bicuspid teeth, especially in the mandible, showed the greatest resistance.

Microscopic examination of the gingival papillae in the early stages of periodontosis showed that the epithelium and subepithelium were relatively free of any changes. As the disease progressed, a slight cellular infiltration in the subepithelium set in which was similar to that found in normal gingival tissue. In the later stages, a heavy cellular infiltration developed in the subepithelial gingival tissue. Opposite the gingival pocket, almost the entire connective tissue was found to be filled with inflammatory cells consisting mainly of polymorphonuclear leukocytes, lymphocytes and plasma cells.

Table 4.—Histologic appearance of gingival papillae in periodontosis with heavy cellular infiltration

Case no.	Sex and age	Epithelium								Subepithelium					Opposite gingival pocket	
		Stratum corneum	Stratum granulosum	Hydropic degeneration of stratum spinosum	Intercellular edema of stratum spinosum	Peg elongation	Mitosis in stratum germinativum	Pearl formation	Cellular infiltration through basal cell layer	Collagen	Edema	Vessel dilatation	Degree of cellular infiltration	Type of cells	Degree of cellular infiltration	Type of cells
57	F32	0	0	+	0	0	0	0	0	±	+	+	+	AB	+++	ABC
48	F35	+	0	+	0	+	+	++	0	±	+	0	+	AB	++	AB
43	F38	0	0	0	0	0	0	0	0	±	+	+	++	AB	+++	ABC
40	F32	−	0	+	0	0	0	0	+	±	0	+	++	AB	+++	ABC
55	F40	0	0	0	0	0	0	0	+	0	0	0	++	ABC	++	ABC
59	F25	0	0	+	0	+	0	0	+	±	+	+	+	AB	++	AB
81	F31	±	±	+	0	0	0	0	+	±	+	0	+	AB	+++	AB
56	F35	0	0	0	0	0	0	0	+	0	0	0	+	AB	++	ABC
51	F45	0	0	0	+	0	0	0	+	0	+	+	+	AB	++	ABC

− = Absent
0 = Normal
± = Present, but less than normal
+ = Slight increase
++ = Moderate increase
+++ = Marked increase
A = Lymphocytes
B = Plasma cells
C = Polymorphonuclear leukocytes

Fig. 8.—Case 40. The keratin layer is missing and there is hydropic degeneration of the stratum spinosum. In the subepithelium, there is a heavy cellular infiltration. The basal cell layer is broken and inflammatory cells are present in the epithelium. The normal marked contrast between the epithelium and subepithelium is lost. (Hematoxylin and eosin; × 130)

The basal cell layer opposite this ulcerated area was generally broken, and inflammatory cells invaded the epithelium.

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DENTAL CARIES EXPERIENCE IN THE VIRGIN ISLANDS

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THIS REPORT is based on data derived from an epidemiologic survey carried out in September, 1948, on the island of St. Thomas, one of the larger of the Virgin Islands of the United States of America, situated in the Caribbean Sea 1,400 miles southeast of New York. A separate report[1] deals with the gingival status of the population in the same age range. A study of the incidence of dental caries in these islands appeared of special interest because of the predominantly Negro population, the comparatively low economic level of the island population as a whole and because of the fact that rain water collected from roofs and catchment areas is the only source of water supply, which is, therefore, probably lacking in fluorides.

The island of St. Thomas occupies 28 square miles of the total area of 132 square miles for the Virgin Islands. The latest census figures (1940) record the population of St. Thomas as 11,265, of which 9,801 are urban and 1,464 are rural. Approximately 42 per cent of the population are under 20 years of age. According to the racial classification used in the 1940 census, 69 per cent of the population are Negroes, 22 per cent are classified as "mixed or other" and only 9 per cent are white. Our investigations revealed that 83.5 per cent of the subjects examined showed the brown or black epithelial pigmentation of the gingival surface considered to be characteristic of the Negro and other dark-skinned races.[2]

No evidence of gross malnutrition was seen among the subjects examined, although a study now being made seems to indicate that, for the year 1946, the average per family per annum income was approximately only $400. The death rate was 16.1 per thousand and the birth rate 39.9 in the calendar year 1945. The infant mortality rate was 109.9 per thousand in 1945 as compared with 101.2 in 1944 and 83.8 in 1943. Apparent causes are stated to be congenital debility, respiratory disease, gastro-intestinal infections and malnutrition.

Material and Method

Every effort was made to obtain a representative sampling of the child and adolescent population of the island. Since 96 per cent of the children of the ages from 5½ to 12 years attend school, with a progressively decreasing percentage in the older age groups, it was believed that an examination of the school-going children would provide a satisfactory sample. As an additional safeguard, the examination was spread over four schools: two public primary-elementary schools

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1. Day, C. D. Marshall-, and Shourie, K. L., Gingival Disease in the Virgin Islands. *J.A.D.A.* 40:175 (Feb.) 1950.

2. Day, C. D. Marshall-, and Shourie, K. L., Hypertrophic Gingivitis in Indian Children and Adolescents. *Indian J. M. Research* 35:161 (Oct.) 1947.

(Washington and Lincoln), one private elementary school (Catholic) and the Charlotte Amalie High School.

A total of 823 subjects of the ages of 6, 8, 10, 12, 14, 16 and 18 were examined with mouth mirror and explorer in a good natural light. An equal number of subjects in each age group was examined by each of the two examiners, who were sufficiently rehearsed by association in similar surveys in India and elsewhere to secure a high degree of uniformity in standards and method.

The presence and condition of deciduous as well as permanent teeth were recorded in all cases where they occurred, but in the groups 12 years of age and upwards, deciduous teeth were not included in the calculations. A total of only 18 decayed deciduous teeth (all in the 12 year group) have been eliminated from the tables. The DMF index (number of decayed teeth (D) missing (M) and filled (F)) has been used to measure the caries experience. Although this method may not yield as detailed information as the A.C.F. (average caries figure) method previously used,[3-7] yet it has been shown to be as useful and statistically sound for static surveys of this kind as any other method.[8] Moreover, because of its simplicity and more universal use, it permits comparisons with surveys elsewhere.

It is estimated that the sample examined constituted one in five of the whole school-going population of the island of St. Thomas, and one in three of the selected age groups.

Findings and Discussion

Table 1 gives the detailed DMF findings for deciduous and permanent teeth of both males and females in the seven age groups examined between the ages of 6 and 18 years. The number of filled teeth constitutes a very small proportion of the total DMF figure. Only 36 children (4.3 per cent) of the total of 823

Table 1.—General findings: DMF deciduous and permanent teeth

Age group	Number of males examined	Number of females examined	Number of teeth present				Deciduous										Permanent											
			Deciduous		Permanent		Male					Female					Male					Female						
			Male	Female	Male	Female	D	M	F	DF	DMF	D	M	F	DF	DMF	D	M	F	DF	DMF	D	M	F	DF	DMF		
6	44	52	752	826	232	347	288	27	4	—	319	316	44	—	—	360	63	1	1	—	65	52	—	—	—	52		
8	57	86	568	794	692	1,152	260	100	6	—	366	400	72	—	—	472	109	1	2	—	112	175	1	1	—	177		
10	57	66	170	142	1,179	1,431	72	52	—	—	124	88	28	—	—	116	209	16	—	—	225	206	33	1	—	240		
12	54	103	—	—	1,402	2,718	—	—	—	—	—	—	—	—	—	—	252	33	10	—	295	566	102	12	1	681		
14	78	79	—	—	2,111	2,087	—	—	—	—	—	—	—	—	—	—	440	78	19	—	537	661	89	21	3	774		
16	47	56	—	—	1,272	1,505	—	—	—	—	—	—	—	—	—	—	278	53	20	—	351	418	103	23	—	544		
18	27	17	—	—	731	469	—	—	—	—	—	—	—	—	—	—	229	69	19	—	317	108	43	23	2	176		
6–18	364	459	1,490	1,762	7,919	9,709	620	179	10	—	809	804	144	—	—	948	1,580	251	71	—	1,902	2,186	371	81	6	2,644		

Table 2.—Number of DMF teeth per subject*

Age group	Number of subjects examined			DMF teeth per subject
	Males	Females	Total	Males and females combined
6	44	52	96	8.3
8	57	86	143	7.9
10	57	66	123	5.7
12	54	103	157	6.2
14	78	79	157	8.3
16	47	56	103	8.7
18	27	17	44	11.2
Total	364	459	823	7.7

*DMF figures for groups 6 to 10 years include deciduous and permanent teeth; DMF figures for groups 12 to 18 years are for permanent teeth only.

examined showed evidence of conservative dentistry in the form of fillings or other restorations. Disregarding teeth already lost by decay, only 168 or 3.1 per cent of the 5,358 decayed teeth had been restored.

Table 2 gives the number of DMF teeth per subject in the various age groups. The number of DMF teeth is relatively high at the age of 6 years; there is a decrease to age 10, at which many newly erupted teeth are present, and then a steady increase to the highest DMF figure (11.2 per cent) at age 18 years. The high DMF figure shown for the 6 year age group is a measure of the early caries activity and the high incidence of decay in the deciduous dentition. The comparatively small number of subjects examined at the age of 18 years constitutes almost the entire school-going population at that age in the island of St. Thomas.

The total number of white children in all age groups was only 78, or 9.5 per cent of the children examined. This percentage is comparable with the 1940 census figure (9 per cent) for the white population as a whole. Despite the small percentage of white children, a comparison was made of the number of DMF teeth per subject and the percentage with caries-free dentitions in Negro and white children. This comparison is shown in Table 3. On account of the small number of white children, two groups only have been compared (6 to 10 and 12 to 18). In both age groups the white children show a significantly higher caries incidence on the basis of percentage with caries-free dentitions and number of DMF teeth per subject.

On the basis of epidemiologic surveys carried out in Africa, it appears that the Negro race has a high immunity to dental caries. Suk[9] has reported a percentage of 85 to 94 caries-free dentitions among Negroes from all parts of Natal and Zululand. From a wide survey the U. S. Public Health Service has reported a much lower caries incidence among Negroes in the United States than in the

3. Day, C. D., Marshall-, and Sedwick, H. J., Studies on the Incidence of Dental Caries. *D. Cosmos* 77:442 (May) 1935.

4. Day, C. D. Marshall-, and Sedwick, H. J., The Fat Soluble Vitamins and Dental Caries in Children. *J. Nutrition* 8:309 (Sept.) 1934.

5. Day, C. D. Marshall-, and Tandan, G. C., The Incidence of Dental Caries in the Punjab. *British D.J.* 69:581 (Dec.) 1940.

6. Shourie, K. L., Dental Caries in Indian Children. *Indian J. M. Research* 29:709 (Oct.) 1941.

7. Shourie, K. L., Dental Caries in Children in Madras City in Relation to Economic and Nutritional Status. *Indian J. M. Research* 30:561 (Oct.) 1942.

8. Jackson, D., An Evaluation of Two methods of Caries Degree Estimation. *British D. J.* 85:79 (Aug.) 1948.

9. Suk, V., Eruption and Decay of Permanent Teeth in Whites and Negroes with Comparative Remarks on Other Races. *Am. J. Phys. Anthrop.* 2:351 (Oct.-Dec.) 1919.

Table 3.—Comparison of number of DMF teeth per subject and percentage with caries-free dentitions in Negro and white children

Age group	Number of subjects		Percentage with caries-free dentitions		Number of DMF teeth per subject	
	White	Negro	White	Negro	White	Negro
6-10	43	319	0	5.6	8.5	7.1
12-18	35	426	2.9	5.6	9.0	7.9
6-18	78	745	1.3	5.6	8.7	7.5

white population.[10] In Rochester, New York, Marshall-Day and Sedwick[3] found a significantly lower incidence in Negro school children than in other ethnic groups. In an examination of white and Negro males at the Ohio State Reformatory, Gafafer and Messner[11] reported 14 per cent immunity among the white males and 23 per cent among the Negro males in the age group 16 to 20 years. Sebelius[12] showed that a significant variation in the dental caries experience existed between white and Negro children in the state of Tennessee. The white children were found to have had the higher total caries experience.

It would seem that on the basis of studies in Africa and the United States, this racial influence does persist to some extent, but is largely overcome by unfavorable conditions of environment and diet. Similar observations have been made in relation to other groups, notably in the case of Americans of Italian descent.[13]

The Negro children of the Virgin Islands do not show as significant a difference in caries incidence in comparison with the local white children as is reported between Negro and white children in the United States and elsewhere. This may indicate a more complete breakdown of the racial influence in this area. The number of DMF teeth per Negro subject is much higher than has been reported in similar age groups even for white children in some areas in the United States.

Comparative caries incidence figures for various population groups are set out in Table 4. It will be seen that, despite the predominantly Negro population, the number of DMF teeth per child is substantially higher in the Virgin Islands in all age groups than in comparable groups in either in the United States or the United Kingdom. It may be that the use of rain water for drinking purposes and the probable lack of fluorine from this source, may be a contributing factor in the high caries incidence in this area, although the high consumption of sweetened beverages in this warm climate cannot be disregarded.

Summary

A dental survey has been made on the island of St. Thomas in the Virgin Islands group. Rain water from catchment areas is the only water available on the island. Associated with this source of the water supply, a high caries incidence is reported. Despite the fact that the population is predominantly Negro (91 per

10. Dental Survey of School Children, Ages 6-14 Years, Made in 1933-34 in 26 States, Public Health Bulletin 226, U. S. Treasury Department Public Health Service, Washington, D. C.

11. Gafafer, W. M., and Messner, C. T., Results of a Dental Examination of 1,908 White and Colored Males at the Ohio State Reformatory. *Pub. Health Rep.* 51:321 (March) 1936.

12. Sebelius, C. L., Variations in Dental Caries Rates Among White and Negro Children. *J.A.D.A.* 31:544 (April) 1944.

13. Schour, I., and Massler, M., Dental Caries Experience in Postwar Italy. *J.A.D.A.* 35:1 (July) 1947.

Table 4.—Comparative caries incidence in population groups

Age in years	DMF per child		
	U. S. A.	United Kingdom	Virgin Islands
6	1.8[14]	—	8.3*
8	5.6[15]*	—	7.9*
10	3.7[15]*	—	5.7*
12	3.0[15]	3.3[16]	6.2
	3.7[14]		
14	3.2	3.8[16]	8.3
	5.0		
16	—	5.8[16]	8.7
18	—	—	11.2

*Deciduous and permanent teeth included.

cent), the number of DMF teeth per subject is substantially higher than has been reported for comparable age groups (6 to 18 years) in various areas of the United States. The average DMF figure (8.3) at age 6 indicates a high degree of caries activity in the deciduous dentition. The average DMF figure ranged from 5.7 in the 10 year group to 11.2 at 18 years.

A comparison of the percentage of caries-free dentitions and the number of DMF teeth per subject in the white and Negro children shows that the possible racial influence in the Negro towards immunity may still persist, but not to as great a degree as reported in the United States and elsewhere. This indicates a more complete breakdown of the racial influence under environmental conditions in the Virgin Islands.

14. Knutson, J. W., and Klein, H., Studies on Dental Caries. IV. Tooth Mortality in Elementary School Children. *Pub. Health Rep.* 53:1021 (June) 1938.

15. Blackerby, P. E., Jr., Intrastate Geographic Variations in Dental Caries Rates. *J.A.D.A.* 30:1241 (Aug.) 1943.

16. Weaver, R., Fluorine and Dental Caries; Further Investigations on Tyneside and in Sunderland. *British D. J.* 77:185 (Oct.) 1944.

HEMOSTASIS AND HEMOSTATIC AGENTS

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The problem of attaining hemostasis, and the agents that can be used safely and effectively to gain this end, are of obvious importance to medicine at large and particularly to the dentist, who often finds it impossible or undesirable to use pressure and sutures to staunch the flow of blood from the oral cavity.

The best way to understand and to evaluate the relative importance of steps in any biologic process is by a survey of the phylogenetic development of the process, in this case the evolution of hemostasis.

As soon as a circulatory system develops, hemostasis becomes of prime importance to the survival of the organism. In the lowest forms of life, the outflow of blood after injury is prevented

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almost exclusively by vasoconstriction, mediated both by nervous reflexes and by the inherent property of all protoplasm, irritability. As one ascends the phylogenetic ladder, a new mechanism appears which is easily demonstrated in the king crab (limulus). These and lower animals do not possess fibrinogen. Limulus, however, does have specialized cells called amebocytes which have the capacity to agglutinate and to adhere to the edges of cut vessels.[1] Following agglutination of the amebocytes there is a gelation of the whole blood. Hence, at this phylogenetic level hemostasis is attained by vasoconstriction, by agglutination of specialized cells, and to a lesser extent by whole blood gelation. As one ascends the phylogenetic scale further, to the stage in which a high blood pressure becomes essential to the animal, fibrinogen and the complex process of blood coagulation appear. In man there are three mechanisms that contribute to the attainment of satisfactory hemostasis; vasoconstriction, agglutination of platelets, and fibrin formation. The first two mechanisms are perfectly adequate to control the loss of blood from capillaries and small veins. However, if prompt firm fibrin formation does not occur, it is impossible to produce spontaneous cessation of bleeding from the arterial side of the vascular system. Blood coagulation is essential for the control of arterial bleeding.

Other local anatomical factors enter into the mechanics of hemostasis. Vasoconstriction and the collapse of blood vessels are aided by surrounding elastic tissues that resist distention. The location of blood vessels affects the ease with which hemostasis is attained and maintained. For example, blood vessels that are exposed to constant motion, as in the hollow viscera, or those that have poor support on one side and a hard bony surface on the other, such as vessels of the nose and oral cavity, are poorly situated for the maintenance of hemostasis because clots are easily dislodged. For those interested in more detail of the mechanics of hemostasis an excellent discussion has been published by Tocantins.[2]

One can summarize the series of events that follow infliction of a wound as follows. First, there is a local and regional spasm of the blood vessels that reduces the flow of blood from the body and into the injured region. Platelets adhere to the traumatized vessels and to each other and may completely plug the leak. Following the clumping of platelets, there is an orderly process of fibrin formation. Lastly, under the influence of the platelets, the fibrin clot retracts and holds the sides of the vessels together. The process of fibrin formation will be considered in greater detail. It is of general interest to outline the various theories of blood coagulation. Although there is still no generally accepted scheme, many phases are universally accepted, and it is to be expected that the mechanism of blood coagulation in its entirety will soon yield to the investigative efforts of groups here and abroad.

The classical theory that has been accepted for years can be expressed diagrammatically as follows: (Fuld, Morawitz, Spiro 1904).

1. Prothrombin + Ca^{++} + Thromboplastin ⟶ Thrombin

2. Thrombin + Fibrinogen ⟶ Fibrin

In this scheme prothrombin present in the plasma is acted upon by thromboplastins (tissue juices) and calcium ions to produce thrombin, which enzymatically transforms fibrinogen to fibrin. Fibrin, in the presence of normal platelets, retracts, expressing serum and holding the edges of vessels together. This basic theory has been modified by many workers recently to include new observations and new chemical factors. For example,

1. Copley, A. L., Clotting of Limulus Blood. *Federation Proc.* 6:1 (Mar.) 1947.

2. Tocantins, L. M., The Mechanism of Hemostasis. *Ann. Surg.* 125:892 (Mar.) 1947.

Seegers and associates (1947) now write the theory with the following equations:

1. Prothrombin $\xrightarrow{\text{Thromboplastin} - Ca^{++}}$ Thrombin

2. Plasma accelerator globulin $\xrightarrow{\text{Thrombin}}$ Serum accelerator globulin

3. Prothrombin $\xrightarrow[\text{Serum Ac-globulin}]{\text{Thromboplastin} - Ca^{++}}$ Thrombin

4. Fibrinogen $\xrightarrow{\text{Thrombin}}$ Fibrin clot

To quote: "The clotting reaction is initiated by thromboplastin which comes from platelets and tissue juices. Some of the newly formed thrombin alters the plasma accelerator globulin so that it becomes the active serum form. The latter intensifies the interaction of prothrombin and thromboplastin. Thrombin thus accelerates its own formation through an intermediate. This may be regarded as 'co-autocatalysis'."[3]

Ferguson[4] diagrammatically subdivides fibrin formation into first and second phases as follows:

First Phase:

Prothrombin + Phospholipid + Ca^{++}

↓

Prothrombin-Cephalin-Ca
(Intermediary complex)

↓

Thrombin

Second Phase:

Fibrinogen $\xrightarrow{\text{Thrombin}}$ Fibrin

The rapid formation of thrombin, according to Ferguson, is dependent upon traces of natural-serum tryptase.

Quick (1948)[5] has developed the following concept. He, as do others, believes that the plasma contains all of the essential elements for fibrin formation. According to his theory there is a thromboplastic precursor in plasma termed "thromboplastinogen" which probably is identical with the antihemophilic globulin of Minot, Cohn, and Taylor and which is converted to thromboplastin by a factor released by breaking up of platelets.

1. Thromboplastinogen $\xrightarrow{\text{Platelet factor}}$ Thromboplastin

2. Prothrombin (components A, B, and labile factor) + Thromboplastin + Ca^{++} ⟶ Thrombin

3. Fibrinogen $\xrightarrow{\text{Thrombin}}$ Fibrin

According to Quick, equation 2 is stoichiometric and 1 and 3 are enzymatic. Thrombin is believed to labilize platelets so that they disintegrate upon contact with a foreign surface, thus producing a chain type of reaction such as occurs with normal blood coagulation.

In summary, the attainment of good hemostasis depends upon satisfactory vasoconstriction, platelet agglutination, and fibrin formation. Any agents that aid the accomplishment of the above are rightly called hemostatic agents.

Under vasoconstrictors one can list epinephrine and all of the sympathomimetic drugs such as ephedrine, phenylephrine and norephedrine. These agents can be of value but are often undesirable because the vasoconstrictive phase may be followed by dilatation, and if significant amounts are absorbed the blood pressure will be raised.

With reference to platelet agglutination there is little that one can do. If platelets are absent it is impractical to replace them by transfusion. If platelets behave abnormally, as they do in some

3. Ware, A. B., Murphy, R. C., and Seegers, W. H., The Function of Ac-Globulin in Blood Clotting. *Science* 106:618 (Dec. 19) 1947.

4. Ferguson, J. H., A Review of Some Basic Facts of Blood Coagulation. *Ann. New York Acad. Sc.* 49: 486 (May 11) 1948.

5. Quick, A. J., A Modern Concept of the Coagulation of Blood. *Marquette Med. Rev.* 13:89 (Apr.) 1948.

hemorrhagic disorders, transfusions may help.

To aid in fibrin formation, the chemical substances considered above in the discussion of blood coagulation theories might be considered of value. To recapitulate:

1. Thromboplastinogen (antihemophilic globulin)
2. Thromboplastin (tissue extracts)
3. Prothrombin
4. Calcium
5. Plasma Ac-globulin
6. Serum Ac-globulin
7. Fibrinogen
8. Thrombin
9. Fibrin

Thromboplastinogen, in Quick's terminology, or more commonly called "antihemophilic globulin," is available in the Cohn fraction I produced from dried human plasma. This fraction consists largely of fibrinogen, but also contains the antihemophilic globulin. This preparation is available through the American Red Cross. It is of no value in aiding hemostasis in the normal individual but of great value in the hemophiliac, as will be discussed later.

Thromboplastin is available in many forms but is of little clinical value because adequate amounts of thromboplastin are present in tissues and because all that thromboplastin can do is to accelerate the production of thrombin from the prothrombin that is present in the patient's blood. Much greater concentrations of prepared thrombin can be added to a wound than can possibly be produced from the patient's prothrombin.

In reality plasma Ac-globulin, serum Ac-globulin, thromboplastin and thromboplastinogen can help only in transforming the patient's prothrombin to thrombin. Hence the level of the patient's prothrombin is the limiting factor in spontaneous fibrin formation provided everything else is normal. The agents enumerated above might be of value in the disease states characterized by their absence.

Calcium levels in the blood are always adequate for coagulation. A calcium level reduced to the point where coagulation would not occur would be incompatible with life. Hence calcium preparations are of no value in aiding hemostasis.

Although prothrombin might be considered desirable, it is difficult to produce, is very labile, and for local use offers no advantages over the direct use of thrombin. In the presence of a prothrombin deficiency, transfusions will supply usable prothrombin and may be of great help. The use of vitamin K will be discussed separately.

Human fibrinogen as mentioned before is available as the Cohn fraction I from the American Red Cross. It is of little value in normal individuals.

Thrombin, which has been considered for years, is readily available and is of proved value when properly used.[6, 7, 8] When thrombin, in concentrated solution or as a powder, is placed upon a bleeding surface, fibrin formation begins in a few seconds. For satisfactory results it is necessary to deliver the thrombin directly to the bleeding ends of the blood vessels, so that fibrin formation is initiated within the vessels and occludes them by a fibrin plug. Introducing thrombin into a pool of blood will produce a clot, but bleeding will continue under the clot and lift it away so that hemorrhage continues. The great virtue of thrombin is that the active coagulating enzyme can be introduced in high concentration to the point where fibrin formation does the most good. Under these circumstances

6. Cronkite, E. P., Deaver, J. M., and Lozner, E. L., Experiences with Use of Thrombin With and Without Soluble Cellulose for Local Hemostasis. *War Med.* 5:80 (Feb.) 1944.

7. Cronkite, E. P., Lozner, E. L., and Deaver, J. M., Use of Thrombin and Fibrinogen in Skin Grafting. Preliminary Report. *J.A.M.A.* 124:976 (Apr. 1) 1944.

8. Seegers, W. H., and Sharp, E. A., *Hemostatic Agents.* Springfield, Ill. C. C. Thomas, 1948.

fibrin formation is complete within 30 to 60 seconds.

Fibrin is of value as a carrier for thrombin, as an absorbable pledget, and as a means of transmitting pressure into cavities. Human fibrin is available in packages with thrombin for local use in wounds.

Other substances have been used as adjuncts to the attainment of local hemostasis. All of the escharotics and astringents such as tannic acid, silver nitrate, alum, chromic acid, zinc, copper and iron salts, and many others have been advocated for topical use. Their value is based on their ability to coagulate proteins. This group of agents can certainly do this and at the same time literally coagulate healthy tissue and produce unnecessary and usually undesirable necrosis. These substances can in no sense compete with thrombin as a local hemostatic and in my opinion have outlived their usefulness for this purpose. However, there are two substances other than fibrin foam that are of great value as adjuncts in the use of thrombin: soluble cellulose (oxidized cellulose) and gelatin foam (absorbable gelatin).

Soluble cellulose as a sponge or pack is described in detail in Seeger's book.[8] Briefly, it is nontoxic and absorbable; it can be used to pack wounds and to carry thrombin, and in addition it has a direct hemostatic action of its own.

Gelatin foam is in the same category as fibrin foam and soluble cellulose sponges. It is relatively nontoxic, nonirritating and absorbable, and it can be used as a wound pack to transmit pressure and as a carrier for thrombin.

Of the agents discussed above, the following can be listed as the most useful members of the armamentarium for local hemostasis in the normal patient:

1. Vasoconstrictor: epinephrine (1:100,000)
2. Fibrin producer: thrombin (1000 units per cubic centimeter preferably)
3. Thrombin carrier: fibrin foam, soluble cellulose, or gelatin foam[6, 7, 8, 11]

Numerous substances have been recommended for parenteral use in the normal individual, among which are Congo red, other dyes, oxalic acid, calcium preparations, and vitamin K. In the normal individual none is of any value.

Administration of vitamin K can be of value only when there is a prothrombin deficit due to a deficiency of vitamin K, which substance is essential for the synthesis of prothrombin by the liver. This condition is suggested by a tendency to bleed from minor wounds. Since vitamin K is synthesized by intestinal micro-organisms of the colon group, which release it upon disintegration, a dietary deficiency of this vitamin can occur only when the intestines have been sterilized, as in prolonged sulfonamide therapy, or in the newborn before they have developed the normal intestinal flora. More frequently a deficiency of vitamin K is due to impaired absorption. Since this fat-soluble vitamin requires bile salts for absorption, a vitamin K deficiency with subsequent hypoprothrombinemia may be produced by such factors as biliary obstruction or fistula, advanced liver disease, insufficient excretion of bile, or in intestinal disorders such as sprue, celiac disease and ulcerative colitis.

The logical conclusion, therefore, is that vitamin K has no hemostatic value in healthy individuals.

Local Hemostasis in the Normal Individual

With the above background, we can now outline a scheme for the attainment of local hemostasis in general, emphasizing the conditions that exist in the oral cavity.

The first and most important step in hemostasis is the ligation of accessible bleeding points and the accurate approximation of tissues by suture if this is not contraindicated by the need for drainage.

If ligature and suture do not provide adequate hemostasis, local pressure may suffice. If bleeding continues, the topical use of thrombin is indicated.

To use thrombin successfully the area should be cleansed, clots removed, and hemostasis temporarily maintained by pressure. Thrombin powder or solution is then applied to the area and permitted to act for a minute before pressure is released. By this time vessels should be plugged with a fibrin clot. Under some circumstances, such as in tooth sockets and in the nose or other cavities, it is desirable to use an absorbable pledget to apply the thrombin. In this case, small bits of fibrin foam, soluble cellulose, or gelatin foam are saturated with thrombin solution and then packed into the clean cavity and held by firm pressure for a minute or so. These packs do not need to be removed and help to give local support to the tissue, thus aiding the thrombin in hemostasis.

At times it might be found desirable to precede the application of thrombin with a vasoconstrictor like 1:100,000 epinephrine, though this is not usually necessary.

It has been considered advisable to pack some cavities with sulfonamides or penicillin. Although sulfonamides apparently do not interfere with coagulation, this is not true of penicillin. The latter, in concentrations over 1,000 units per milliliter, will impede coagulation. Contraction of the clot is reduced with over 300 units per milliliter. These disadvantageous properties of penicillin apply only when the antibiotic is used locally and are of no importance when it is used systemically.[9]

Local Hemostasis in the Hemophiliac

Fatal hemorrhage following extraction of teeth was often seen in hemophiliacs in years past. Accordingly, surgeons and dentists have avoided the treatment of hemophiliacs. In recent years, largely as a result of the clinical investigations of the Boston group (Minot and associates[10,12]) the surgical and dental care of hemophiliacs has become relatively safe.

A word about the nature of hemophilia is in order. The disease is hereditary and believed due to the absence of the gene which is responsible for the synthesis of the antihemophilic globulin (thromboplastinogen of Quick). As such, a cure is impossible. The basic defect is an inability of the hemophiliac to rapidly transform prothrombin to thrombin. The exact nature of this defect is poorly understood, but hemophilic blood can be clotted rapidly by adding thrombin, and spontaneous clotting is accelerated by injection of antihemophilic globulin or normal blood plasma. These facts are the basis of the clinical studies of Minot[10] and Lozner.[12] The latter demonstrated that nosebleed in the hemophiliac can be controlled by the topical use of thrombin. Minot and others have shown that the combined use of Cohn fraction I (containing antihemophilic globulin), blood plasma, whole blood, and topical thrombin makes extractions and many other surgical procedures safe. The hemophiliac should be prepared for surgical procedures by the intravenous injections of 500 mg. of fraction I plus 100 ml. of plasma at four-hour intervals for 48 hours before and after surgery. Thrombin should be used routinely as described previously. When this routine is followed, extraction of teeth from the hemophiliac should not be unduly feared.

9. Fleming, Alexander and Fish, W. E., Influence of Penicillin on Coagulation of Blood With Especial Reference to Certain Dental Operations. *Brit. Med. J.* 2:942 (Aug. 16) 1947.

10. Minot, G. and Taylor, F. H. L., Hemophilia: Clinical Use of Antihemophilic Globulin. *Ann. Int. Med.* 26:363 (Mar.) 1947.

11. *Accepted Dental Remedies*, Chicago, A.D.A. Council on Dental Therapeutics, 1948.

12. Lozner, E. L., MacDonald, H., Finland, M., and Taylor, F. H. L. The Use of Rabbit Thrombin as a Local Hemostatic. *Am. J. M. Sc.* 202:393 (Oct.) 1941.

Local Hemostasis in the Purpuras

The purpuras can be divided into the thrombopenic and the nonthrombopenic groups. The thrombopenic purpuras are either primary (idiopathic thrombopenic purpura, essential purpura, Werlhof's purpura, hypersplenic purpura, purpura hemorrhagica) or secondary. The primary purpuras are related to the spleen and a high percentage of them are relieved by splenectomy. The secondary purpuras are a result of drug or industrial intoxication or perhaps are incidental to some other disease such as leukemia. The nonthrombopenic purpuras are either allergic or toxic in origin. All purpuras are basically handled in the same way. In order of importance the following may be listed:

1. The proper diagnosis
2. Removal of toxic agent
3. Bed rest
4. Transfusions as needed
5. Splenectomy for primary purpura

There is no satisfactory way to control the local bleeding. Whole blood transfusions at frequent intervals help. Splenectomy gives dramatic results in a high percentage of cases of primary purpura, but in the secondary purpuras it generally results in a fatal outcome.

Surgical procedures, other than a well considered splenectomy, should be scrupulously avoided in the presence of purpura. No drugs are known that will help significantly. Rutin (rhamnoglucoside of quercetin) has been advised.[13] Personal experiences have not shown the drug to be of much value. Recently adrenoxyl has been reported from Belgium as of great value in the therapy of purpura.

Summary

The modern approach to hemostasis is based upon the time honored principles of careful ligature and suture and, as an adjunct, a physiologic approach to aid spontaneous fibrin formation when needed. The latter involves the use of the natural substances that cause blood coagulation *in vivo* and *in vitro*, thus producing a coagulum painlessly at the orifice of the severed vessels without causing necrosis of contiguous tissue.

13. Couch J. F., Krewson, C. F., Maghski, J., and Copley, M. J., The Chemistry and Therapeutic Uses of Rutin. U. S. Dept. Agriculture, Bureau of Agricultural and Industrial Chemistry. April 1948. AIC-115.

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The Rights of Man.—Man has an inherent, inalienable right to life, liberty, and the fruits of his labors and the right to such contracts as will insure him the fruits of his labors. The Constitution specifically guarantees to every citizen these rights and assures every citizen that these shall not be taken away from him except by due process of law. From this it is evident that no human being or no association of human beings, such as the state, has any right to infringe upon any inherent right of another. The state has no legal right and certainly no moral right to take the result of one man's labors and give it to another, and yet this is just exactly what every form of social insurance actually does.

Probably the worst of all the bad features of social insurance is the fact that when this parasite once gets its suckers well fastened into the vitals of a nation nothing short of either national bankruptcy, a dictatorship, or a revolution will be able to loosen its hold.—*Hon. Frederick C. Smith, "Social Security," Socialized Medicine; Extension of Remarks of Hon. Frederick C. Smith of Ohio and Hon. Roy O. Woodruff of Michigan in the House of Representatives, January 13 and 17, 1949.*

A PERMANENT AND ESTHETIC ANTERIOR RESTORATION

Bruce B. Smith, D.M.D., Seattle, Wash.

THE color of gold foil has always been considered a contraindication for its use. This contention is true to a degree though often the operator influences the patient in this respect. The chief objections, often mild, are in the Class III, Class IV and anterior Class V cavities; however, in posterior Class V, Class I, Class II and most Class VI abrasion cavities[1] its appearance is less conspicuous than any restoration in cast gold or amalgam. Silicate cement is nothing more than a temporary material and it should not be used except in a few special circumstances. The harm it is capable of doing more than outweighs any slight temporary esthetic benefits.

The classic permanent restorative material in dentistry is still gold foil. Gold foil when worked properly has a density comparable to that of cast gold. As it is built up its laminations and tempering impart a certain degree of strain resistance, and as it is finished its margin becomes not only waterproof but the finest filling margin in dentistry. It is the close association with these margins which aid men proficient in handling this material to become superior operators.

For about 15 years previous to World War II the use of gold foil enjoyed a fresh and distinct increase. Even though most of its staunch supporters who graduated between 1895 and 1910 were dropping out of practice it steadily increased in popularity. More gold foil was used throughout the country, indicating strongly that the number of dentists who took up its use from 1926 to 1941 was greater than those who retired from dental activity. However, the war arrested the development of new recruits, tended to reduce foil activity in overcrowded practices and deprived many operators of invaluable dexterity as their skill fell beneath their prewar standards.

In recognizing both the contemporary situation and the marvelous adaptability of gold foil, the present challenge will be accepted and patients will be given the full advantages of this great material. Since gold foil requires no cement as do gold and porcelain inlays, it is apropos to quote from Hollenback.[2] He states:

> I have had occasion to remove hundreds of cast restorations, some excellent, some very poor, the majority mediocre. Not in a single instance where the restoration has done service for any considerable length of time have I failed to find evidence of disintegration of the cement.

Properly condensed foil will not absorb oral secretions as will acrylics, it will not wash out as will the silicate cements and it will not expand or flow as will amalgam.

The contraindications to the use of gold foil are extremely few and usually self-evident. Ferrier[3] has said, "Gold foil

Presented at the midwinter meeting of the Seattle District Dental Society, Seattle, February, 1949.

Clinical Assistant Professor in Fixed Partial Denture Prosthesis and Operative Dentistry, School of Dentistry, University of Washington, Seattle.

1. Baird, G. B., One Hundred and Eighty-Six Potential Areas on Tooth Surfaces Where Gold Foil May Be Used to Replace Lost Tooth Structure. *J.A.D.A.* 20:120 (Jan.) 1933.

2. Hollenback, G. M., Gold Foil (discussion). *J.A.D.A.* 18:1483 (Aug.) 1931.

3. Ferrier, W. I., Clinical Observations on Areas of Erosion and Their Restoration. *J.A.D.A.* 20:1150 (July) 1933.

may be used in more than 30 per cent of filling operations." The title of the article "One Hundred and Eighty-Six Potential Areas on Tooth Surfaces Where Gold Foil May Be Used To Replace Lost Tooth Structure"[1] is sufficient to prove the demand and indication for this fine medium. It is easy to apply many good reasons for not using gold foil if a man needs further training. Actually here we find its truest contraindication, for a poorly placed foil may fail within a shorter time than any other material. This noble metal further demonstrates its reliability by not tolerating inefficient technics, and the restoration is a success or a failure at the time the operation is completed.

The anterior Class III cavities in some locations are very inconspicuous with modern cavity design; notably the distal cavities in upper lateral incisors, some upper central incisors and the distal cavities of most upper cuspids.

Many fine methods for reducing the amount of gold that is visible in Class III cavities have been designed.[4,5] Some have been published and others, though not written up, have been presented before groups of professional men.[6] Some require special instruments, some require working with a mirror, some require noncohesive foil, some require more than average ability for the general practitioner, some destroy the lingual ridge of the tooth and some call for excessive separation which is not always possible and may not be practical if the teeth are lapped to a great degree. The majority of methods involve a careful consideration of the type of mouth in which they are used because of reductions of extension, particularly toward the gingival margin.

In the technic presented here the object in view is to render the best service possible, with the use of gold foil, and avoid the display of gold in an area which is extremely prominent. It is possible to do this without special equipment, with ease and dispatch and without undue strain to the patient or operator.

The upper cuspid in most mouths has its labial surface standing out a little labially to the lateral incisor as the arch curves distally. This makes any restoration on the mesial surface of the cuspid particularly difficult to render inconspicuous. The outline form can be restricted to a degree, but the amount of restriction is limited because the tooth is thick and the foil condensers must reach through from the labial extension all the way to the linguoaxiogingival point angle.

Cavity Description

In a mouth where gold foil is indicated, which in a trained operator's practice means the majority of cases,[7] a lingual approach on the mesial aspect of the upper cuspid can usually be made with the labial wall ending just labially of the contact area where its margins will be reached by the normal excursions of the toothbrush. The lingual extension on this thick tooth is made adequate to allow free access with the foil condensers but does not destroy the marginal ridge, thereby weakening the tooth. It is in a self-cleansing area. The gingival margin is placed where it will be covered by normal gum tissue and will not be subject to recurrent caries. The incisal extension is carried incisally from the contact until it is in a self-cleansing area.

From a proximal view the labial outline is straight and parallel with the long axis on the tooth (Fig. 1). However, owing to the curvature of the tooth surface, an optical illusion is created when the slight extension is viewed from a mesiolabial aspect. This may give the

4. True, H. A., Inconspicuous Class III Gold Foil Restorations. *J.A.D.A.* 30:1352 (Sept.) 1943.

5. Jones, E. M., Treatment of Initial Caries in the Anterior Teeth with Gold Foil. *J.A.D.A.* 26:532 (April) 1939.

6. Presented at alumni meeting, University of Oregon Dental School, Portland, 1948.

7. Ferrier, W. I., Treatment of Proximal Cavities in the Anterior Teeth with Gold Foil. *J.A.D.A.* 21:571 (April) 1934.

impression of a slight harmonizing curve but will not influence the ease of foil placement (Fig. 2). The lingual outline lies about halfway in and parallel with the mesiolingual lobe, running incisally in a straight line where in the last quarter of its length it makes a graceful curve to allow access into the incisal retention (Figs. 3 and 4). The gingival outine is straight but not at right angles to the

Fig. 1.—Proximal view of cavity

long axis of the tooth for owing to its labiolingual position on the tooth and the inclination of the cementoenamel junction it forms a slightly obtuse angle with the labial wall.

The gingival wall meets the axial wall of the tooth at a slightly acute angle, and retention points are located at the linguogingivoaxial point angle and the incisal angle. Because of the large amount of tooth structure on the labial aspect the internal portion of the entire labial wall is made retentive. All of this retention form may be cut using small delicate angle formers, 7-80-2½-9. But if necessary the incisal retention may be augmented by the use of the small hatchet 3-2-28.

To aid strength and convenience the internal portion of the lingual wall meets the axial wall at a slightly obtuse angle.

Operative Technic

The position of the patient is very important throughout the operation. The chair is tilted to about a 45 degree angle to the floor and the patient's head is tilted to about a 45 degree angle to his back. This places the upper arch in a plane which is almost at right angles to the plane of the floor. With the patient so situated and his head rotated to the side on which the tooth is located, the

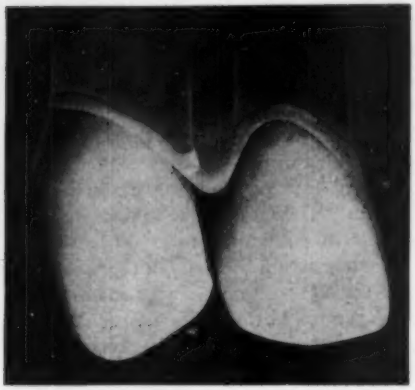


Fig. 2.—Cavity view from extreme mesiolabial aspect with phantom gum tissue, showing the maximum possible amount of gold in sight at any time

operator has easy access to and direct vision into the cavity as he opens it.

The separator may be applied before the operation is started in order that the lingual extension for access may be cut to allow the gold condensers to pass by the separator frame. If the operator prefers, however, he may obtain a sufficient excess of gold at the contact area by wedging the gold against the lateral incisor and place the separator later immediately prior to finishing the restoration. I have

found that the double bow separator has the advantage of distributing the strain of separation over a greater area whereas the single bow separator offers greater operating space.

The cavity is opened from the lingual surface using a fine hoe such as the No. 23 (6½-2½-9) of the Ferrier study club set or the smallest Wedelstaedt chisel (11½-15-3). With the inverted cone bur

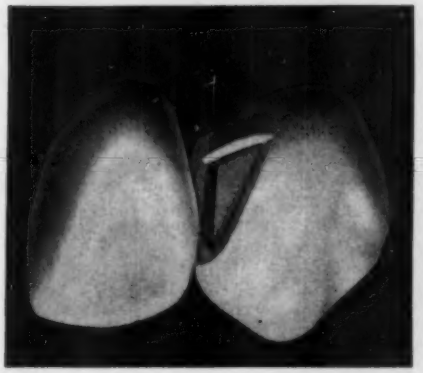


Fig. 3.—Lingual view

33½ or 34 in the straight handpiece the gingival wall is established carrying the linguogingival angle well toward the lingual surface to insure convenience in placing the foil. The inverted cone bur may also aid in the formation of the lingual wall by moving the handpiece into a more horizontal position and by cutting just short of the expected lingual extension. The outline of the lingual wall is completed with the narrow Wedelstaedt chisel. It is used in a planing manner from the incisal curve to the gingival shoulder. With hoe 23 establish the internal portion of the lingual wall by cutting with the side of the instrument. The end of the hoe also works efficiently to finish the labial wall and the interior of the cavity. With the placement of retention areas in the incisal angle, in the labial wall and in the axiolabiogingival and axiolinguogingival angles by the use of the small angle formers the cavity is complete. Cutting instruments are shown in Figure 5. If the cavity is well finished and the walls well planed with sharp instruments a separate cavosurface bevel is unnecessary, for the planing in itself will almost always add the slight bevel necessary for fine work.

Foil Placement

The placement of the foil may nearly all be done with a long, binangle condenser 0.5 mm. in diameter (Fig. 6), although a small bayonet may be used ad-

Fig. 4.—Linguoincisal view

vantageously along the lingual wall. The gold is placed in the usual Class III manner (Figs. 7 to 10) by making a gingival triangular bar first. However, the first pellets, usually 1/64 of No. 4 foil, are placed in the labioaxiogingival angle instead of the linguoaxiogingival angle. The point of utmost importance in gold placement is insuring that an excess of gold is forced through and protrudes slightly beyond the cavosurface angle of the labial wall along the entire border of the cav-

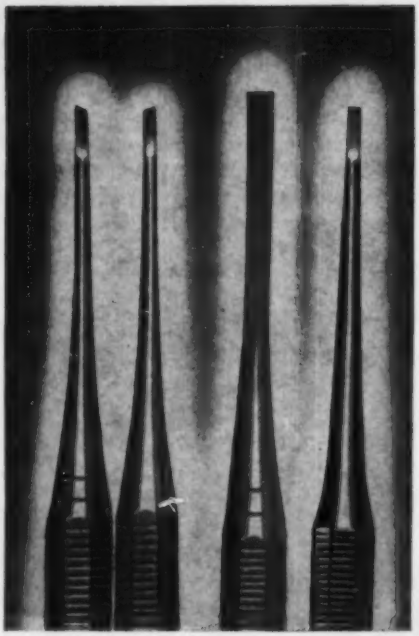


Fig. 5.—Cutting instruments used

ity. This insures a finely condensed and finished labial margin when the work is completed.

The lines of force are almost determined for the operator by the angle of his binangle condenser, for, in order to reach through to condense the first pellets of foil, the shank of the instrument is guided by the lateral incisor and as the nib contacts the gold the shaft is directed parallel with the labioaxiogingival line. The action drives the foil into the cavity at all times.

The important steps of "making the turn" at the incisal angle and the condensation of the foil in the incisal retention are facilitated by the easy direct entry of the condenser into this area. Figure 9 illustrates clearly how the foil is inclined into the incisal retention form, giving the greatest wedging action incisogingivally. The retentive labial wall stabilizes the gold at this point as the operator changes his angle of force to an incisoaxial direction and condenses a pellet in the incisal retention. As the two masses of gold are connected by subsequent pellets the angle of force must be directed axially but always at a right angle to the surface of the concavity between the main body of foil and the foil in the incisal area. When the turn is completed (Fig. 10), the bayonet condenser may be used to complete the remainder of the filling and give sound condensation along the lingual wall.

"After-condensation" is best done with a tiny foot plugger and a burnisher. Then the bulk of excess gold is removed with files and by properly working a very sharp gold knife over the restoration so that it exerts a condensing action as it

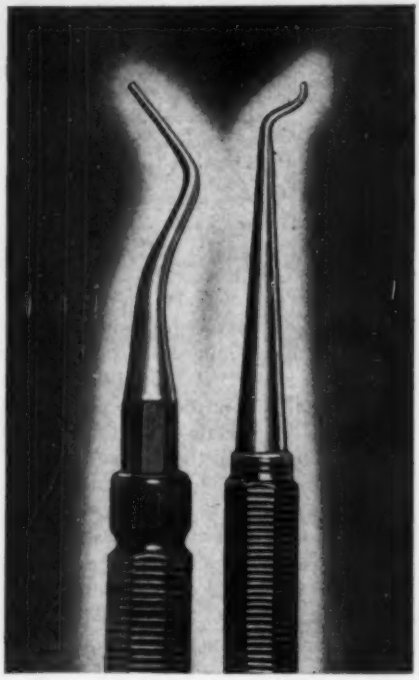
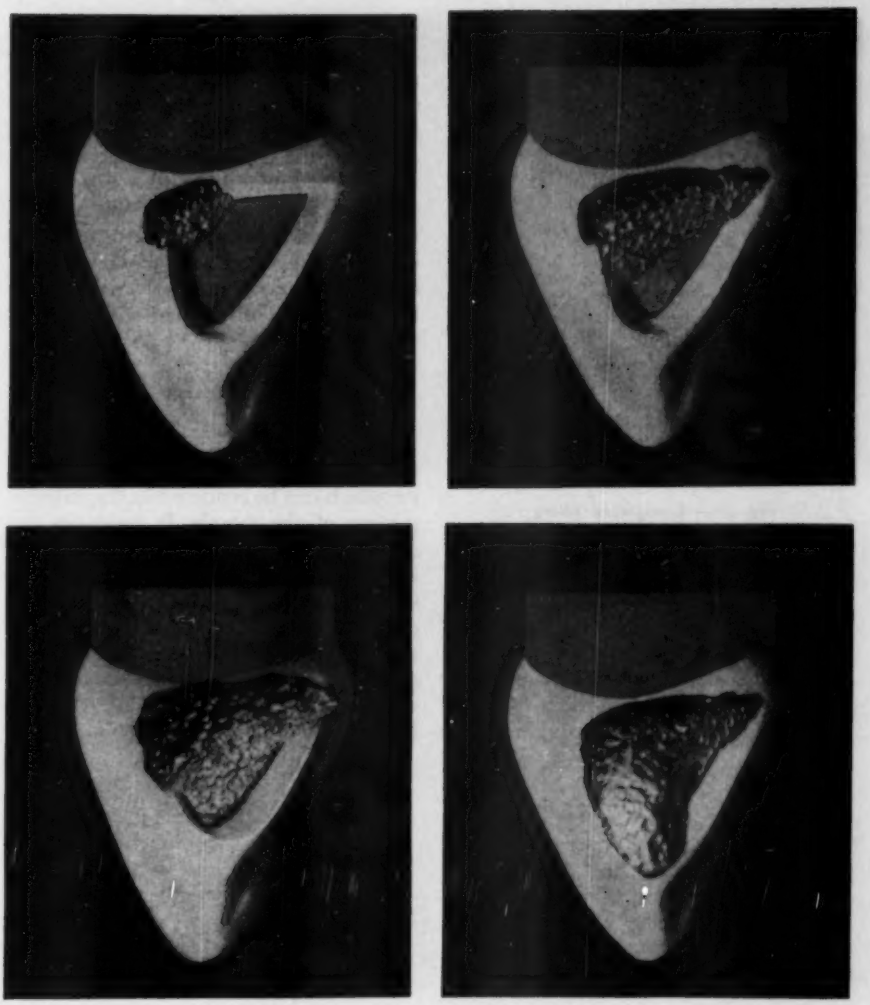


Fig. 6.—Foil condensers. Must be well made to minimize slight springing effect



Figs. 7, 8, 9, 10.—Steps in foil placement

pinches off and lightly shaves the gold to margin.

Finishing

The finishing is done by first securing a slight additional separation and passing a fine Arrow (Grobet, Swiss made) saw or steel strip through the interproximal area. This is followed with the slightly thicker Gordon-White saw. Graded abrasive strips and the use of disks on the exposed lingual area will complete the operation leaving the operator well satisfied at having completed an esthetic and durable service for his patient (Fig. 11).

Fig. 11.—Completed filling

Summary

A description of an esthetic gold foil operation which may be done with ease and dispatch is presented. A lingual approach is used and all work is done by direct vision. No special equipment is needed and extension principles are respected. There is no soft foil adjacent to the contact point. A minimum variety of cutting instruments and condensers is necessary. Tooth morphology is considered and the lingual marginal ridge is neither undermined nor destroyed. There is adequate retention and resistance to stabilize and balance lingual stresses. Finishing is expedited and simplified as a result of direct lingual access to two thirds of the filling surface.

Conclusions

An esthetic gold foil filling is unquestionably the finest type of operative service which can be rendered in the anterior portion of the mouth. It combines the most permanent type of filling material known with the salient attribute of porcelain; namely, it is hidden from the casual observer. The operating method described is practical and simplified so that the average operator who uses gold foil should experience little difficulty in placing a fine and durable restoration.

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Professional Ethics under Dictatorship.—Science under dictatorship becomes subordinated to the guiding philosophy of the dictatorship. Irrespective of other ideologic trappings, the guiding philosophic principle of recent dictatorships, including that of the Nazis, has been Hegelian in that what has been considered "rational utility" and corresponding doctrine and planning has replaced moral, ethical and religious values. Nazi propaganda was highly effective in perverting public opinion and public conscience, in a remarkably short time. In the medical profession this expressed itself in a rapid decline in standards of professional ethics. Medical science in Nazi Germany collaborated with this Hegelian trend particularly in the following enterprises: the mass extermination of the chronically sick in the interest of saving "useless" expenses to the community as a whole; the mass extermination of those considered socially disturbing or racially and ideologically unwanted; the individual, inconspicuous extermination of those considered disloyal within the ruling group; and the ruthless use of "human experimental material" for medico-military research.—*Leo Alexander, "Medical Science Under Dictatorship," New England J. Med. 241:39, July 14, 1949.*

COUNCIL ON DENTAL TRADE AND LABORATORY RELATIONS

DENTAL GOLD STUDY

THERE have been definite proposals during the past year from various sources to increase the price of gold from its present peg of $35 per ounce. The Council, after studying these proposals and other phases of the subject, is of the opinion that the possibility of pegging the price of gold at a higher level than the present one is very remote.

In 1939, the amount of gold used by the dental profession and allied crafts amounted at $8,256,000. The latest available figures are for 1947, at which time the estimate was between $18,000,000 and $20,000,000. This is supposed to be a big year, due to the increasing use of chrome alloys which are taking the place of gold. The Secretary of the Treasury at his press conference October 6, 1949, stated that this government has no intention of proposing a change in the dollar price of gold, that it is in the interest of our government to maintain a stable price of gold.

There has been a great deal of confusion as to how a change in the gold price would take place. The President's authority to change the gold content of the dollar expired June 30, 1943. Such action must now be taken by the Congress of the United States. The Secretary of the Treasury has authority under Sections 8 and 9 of the Gold Reserve Act of 1934 to buy and sell gold as he may deem the most advantageous to the public, but this authority is now limited under the obligations the United States took when it became a member of the International Monetary Fund. The International Monetary Fund subscribed to by the United States pursuant to the Bretton Woods Agreements Act of July 31, 1945, reads as follows:

> Article 4, Section 2, provides the funds which prescribe a margin above and below par value for transactions in gold by members, and no member shall buy gold at a price above par value plus the prescribed margin, or sell gold at a price below par value minus the prescribed margin. The Fund has prescribed a margin of ¼ of 1 per cent. Accordingly, consistent with its obligations under the Fund, the United States is limited to sales of gold at $35 an ounce, plus or minus ¼ of 1 per cent.

Increasing the domestic price of gold means devaluation of the dollar. England recently devalued the pound sterling. After a great deal of study and conference with the United States Government, an agreement was reached as to the value of the pound in relation to the United States dollar. The value was placed at $2.80. Any attempt made to change the price of gold would automatically upset the whole uniform economy and would nullify the agreements between the English government and ours.

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

INCOMES OF DENTISTS

In 1949 the U. S. Department of Commerce, with the cooperation of the American Dental Association, made a survey of the incomes of dentists. Questionnaires were sent to one-third of all active civilian dentists, of whom approximately 11 per cent submitted usable returns. Detailed results of the survey are published in an article entitled "Income of Dentists, 1929-1948," by William Weinfeld, in the January, 1950 issue of Survey of Current Business, published by the Department of Commerce. Copies of the publication may be obtained by sending 25 cents to any Department of Commerce Field Office or to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or copies of the article on incomes may be obtained from the Bureau of Economic Research and Statistics, American Dental Association. The survey covered the years 1944 through 1948, and was similar in design to a survey made in 1942, in which the Association took a very active part.

Results of the survey indicate that dentists who were members of the American Dental Association had an average net income about double that of nonmembers.[1] Mean net incomes in 1948 were $7,503 for members and $4,183 for nonmembers, while the respective median net incomes were $6,424 and $3,183.[2] The mean net income for all dentists was $6,912, and the median net $5,888, but there were important variations according to geographic location, age, specialization, number of employees and salaried as compared with independent practice. Table 1 shows mean incomes annually since 1944, and incomes by age groups may be found in Table 2. The percentage of dentists falling in the various income brackets may be found in Table 3, and Table 4 shows income by size of town or city.

The survey showed that the net-to-gross income ratio for nonsalaried dentists in 1948 was 55.4 per cent, which is to say that the cost of conducting a practice was on the average 44.6 per cent of gross income. This overhead figure includes dentists with several employees as well as those with one or no employee, so its value to the individual dentist for purpose of comparison is limited.

About 8 per cent of all civilian dentists received a major portion of their dental income in 1948 from salaried practice, compared with 5.2 per cent in 1940. Mean net income for independent dentists ($7,047) was considerably higher than that for salaried dentists ($5,358), but in terms of the median, the difference between the two groups was less marked (independent, $5,944, and salaried, $5,295).

Only 3 per cent of the independent dentists practiced in partnerships in 1948, while another 10.6 per cent shared office space or employees. Of the salaried dentists, about one-third were employed

1. The term "net income" includes both net entrepreneurial income and salaries received for dental work, before payment of income taxes. It excludes income received from nondental work.

2. The median income is that amount which is exceeded by half of the dentists. Incomes are first ranked from lowest to highest, and the median is that income occupying the middle rank. The mean is what is commonly known as the average. Incomes are first added, then divided by the number of incomes to obtain the mean.

Table 1.—Average net income of dentists, 1944 to 1948

Year	Nonsalaried dentists		Part-salaried dentists		All-salaried dentists	
	Mean	Median	Mean	Median	Mean	Median
1948	$7,039	$5,939	$6,267	$5,395	$5,691	$5,486
1947	6,610	5,544	6,470	5,143	6,021	5,769
1946	6,381	5,142	6,059	5,031	5,271	4,750
1945	6,922	5,439	6,255	5,750	6,281	5,500
1944	6,649	5,353	6,376	5,292	5,761	5,104

Source: U. S. Department of Commerce, Office of Business Economics.

by other dentists and about two-thirds by industry and government.

Of the respondents, 5.6 per cent said they were wholly specialized and 5.9 per cent partly specialized. Full specialization was claimed by a greater proportion of salaried dentists (14.4 per cent) than independent dentists (4.9 per cent). Mean net income for wholly specialized independent dentists in 1948 was $11,784, 75 per cent more than the mean of $6,735 reported by independent general practitioners, while the mean of part specialists was only 17 per cent above that of general practitioners. In 1937 complete specialists earned twice as much as general practitioners. Incomes of salaried specialists in 1948 were only slightly higher than those of salaried general practitioners.

Among full specialists responding, half were orthodontists, 22 per cent were oral surgeons, exodontists or endodontists, 14 per cent were pedodontists, 7 per cent were prosthodontists and 5.5 per cent were periodontists. The mean net income of nonsalaried orthodontists in 1948 was $13,353. Nonsalaried oral surgeons (including exodontists and endodontists) ranked second with a mean net of $11,641. Returns from other specialists were too sparse to yield reliable results.

It will be noted from Table 4 that income is affected considerably by size of city or town, those dentists in very large cities and very small towns being at a

Table 2.—Average net income of dentists by age groups, 1948

Age	Per cent of dentists	Mean net income	Median net income	Per cent increase in mean net income 1937 to 1948
Under 25	1.8	$2,823	$2,344	148
25-29	14.3	4,707	4,398	144
30-34	13.6	7,347	6,663	142
35-39	12.7	8,788	7,568	140
40-44	11.2	9,117	8,128	162
45-49	10.5	8,564	7,366	152
50-54	10.7	8,225	7,066	177
55-59	9.1	7,103	6,119	169
60-64	5.5	5,032	4,053	122
65 and over	10.7	3,227	2,449	88
All dentists	100.0	6,912	5,888	137

Source: U. S. Department of Commerce, Office of Business Economics.

disadvantage. In small towns the lower mean income may be explained, at least in part, by the greater mean age. Table 2 indicates the importance of the age factor in income.

About 37 per cent of nonsalaried den-

Table 3.—Percentage distribution of dentists by net income levels, 1948

Net income level (dollars)	All dentists	Dentists by major source of dental income	
		Independent practice	Salaried practice
Loss: 1-3,999	1.0	1.1	0.3
0-1,999	11.4	11.3	13.5
2,000-3,999	17.8	17.9	16.3
4,000-5,999	20.9	20.3	27.4
6,000-7,999	16.2	15.2	27.3
8,000-9,999	11.4	11.7	7.8
10,000-11,999	8.0	8.4	3.3
12,000-14,999	6.0	6.2	3.6
15,000-19,999	5.2	5.6	.5
20,000-24,999	1.3	1.4	—
25,000 and over	.8	.9	—
Total	100.0	100.0	100.0

Source: U. S. Department of Commerce, Office of Business Economics.

Table 4.—Average net income and age of dentists by size of community, and for selected large cities

Size of community[1]	Per cent of dentists	Mean net income	Median net income	Median age	Per cent increase in mean net income 1937 to 1948
Under 1,000	3.6	$5,010	$4,450	49	131
1,000-2,499	6.9	5,649	5,060	47	137
2,500-4,999	6.3	6,870	5,927	39	150
5,000-9,999	7.8	6,485	5,761	43	138
10,000-24,999	11.7	7,180	6,078	42	136
25,000-49,999	8.6	7,962	7,045	43	160
50,000-99,999	7.2	8,125	6,886	44	160
100,000-249,999	9.3	8,105	6,938	43	144
250,000-499,999	9.2	7,254	6,458	43	144
500,000-999,999	8.8	7,352	6,182	45	145
1,000,000 or more	20.6	5,980	4,962	43	99
United States	100.0	6,912	5,888	43	137
San Francisco	1.0	9,577	8,750	43	Not available
Los Angeles	2.5	8,562	7,750	43	152
Cleveland	1.3	7,341	5,778	43	Not available
Detroit	1.7	6,919	5,958	44	117
New York	10.8	5,609	4,385	42	76
Chicago	3.6	5,294	4,846	45	107
Philadelphia	2.0	5,216	4,722	42	103

1. According to 1940 population figures.
Source: U. S. Department of Commerce, Office of Business Economics.

tists had no employees in 1948 and about 42 per cent had only one employee. A high correlation exists between the number of employees and income. Mean net income for dentists with no employees was $3,819, for dentists with one employee it was $8,134, while for dentists with five or more employees the mean net income was $18,955.—*B. Duane Moen, Assistant Director.*

COUNCIL ON DENTAL THERAPEUTICS

ACCEPTED DENTAL REMEDIES

THE Council on Dental Therapeutics of the American Dental Association announces the addition of the following products to the list of *Accepted Dental Remedies, 1950:*

Mechanical Aids

Precipitated Calcium Carbonate, Dense, Ultra-Fine—Wyandotte: See A.D.R., ed. 15, p. 112. The material is stated to meet the standards of purity specified by the U. S. Pharmacopoeia, edition XIII.

Abrasiveness: The abrasiveness as measured in the Bureau of Chemistry was found to be:

Dense 8.3 mgs.

Ultra-Fine 3 mgs.

Other physical characteristics are available and will be included in the next edition of A.D.R.

Manufactured by Wyandotte Chemical Corporation, Michigan Alkali Division, Wyandotte, Michigan.

Anesthetics—Local

Procaine HCl 2%, Epinephrine 1:25,000—Dentule Brand: Each cubic centimeter is stated to contain procaine HCl, 0.02 Gm.; epinephrine, 0.00004 Gm.; sodium chloride, 0.004 Gm.; sodium bisulfite, 0.0015 Gm., and distilled water. Marketed in 2.3 cc. cartridges.

Procaine HCl 2%, Epinephrine 1:50,000—Dentule Brand: Each cubic centimeter is stated to containe procaine HCl 0.02 Gm.; epinephrine, 0.00002 Gm.; sodium chloride, 0.004 Gm.; sodium bisulfite, 0.0015 Gm., and distilled water. Marketed in 2.3 cc. cartridges.

Manufactured by Atlantic Manufacturing Corporation, Brooklyn, New York.

Phenolic Compounds

MacDonald's Eugenol: A brand of eugenol, U.S.P.

Manufactured by the MacDonald Company, St. Paul, Minnesota.

Admission to *Accepted Dental Remedies* means that the product was found to meet the provisions for acceptance of products by the Council on Dental Therapeutics when it was considered. Accepted products are reconsidered periodically. The files of the Council contain information on many drugs and dental cosmetics and inquiries are welcomed.—*J. Roy Doty, Secretary.*

REPORT OF THE COUNCIL ON LEGISLATION

IT'S YOUR DECISION

THIS is a year of decision. In every state, primary and general elections will be held to choose the members of the federal House of Representatives and in one-third of the states to choose United States senators.

Out of these elections will come the Eighty-second Congress which will be again confronted with important legislative proposals relating to health. The time to consider the personnel who will make up that Congress is now, not next year.

Dentists frequently write to the Council on Legislation and inquire how they may help in the legislative effort to enact, amend or defeat some pending measure. Usually they offer to write to their congressmen. This procedure is good but its value is frequently lost because the letter is received at a critical time with regard to the status of the particular legislation and it is weighed as being for or against, whereas it should be studied with careful attention and treated according to the merit of the arguments and reasoning contained.

Now, however, something can be done which will be of great help to all dentists when their profession may be affected by proposed federal legislation. That something is to take an active part in the elections which will soon be upon us.

How to do it? Simple. In every Congressional district each party will have one or more persons seeking the nomination to Congress. These men need help and support in their contests. If, in every Congressional district, each dentist would examine the primary candidates of the party of his choice, choose one and work for his election, he would gain recognition that would be helpful to the profession if his candidate were elected. Without involving or committing the local society or the state society but solely on his own, as a registered voter of the district, every dentist should carefully examine the qualifications of the candidates offering themselves for office. With these in mind he should go personally to the candidate and offer his services. (When a candidate is seeking office he is happy to see anyone who wants to help.) Health problems will be an extremely important issue in the campaign. Candidates will be glad to have the professional advice and assistance of dental members of the community.

Having offered his services the dentist should actually work as hard as time permits to see his candidate chosen as the primary victor. There is nothing unbecoming about a professional man participating in elections—and in this day of constant federal pressure it is almost a matter of professional survival to do so.

The task will not be over with the primaries except in those states where nomination is equivalent to election. In the others the same type of assistance will be needed in the general election.

When the candidate of the dentist's choice is elected the dentist should step more directly into the picture. If the dentist has worked for his candidate's election he should have reasonably good access to the newly chosen congressman. This is the time to seek an opportunity to discuss with him the basic and oral health needs of the community and of the nation; to give him the profession's viewpoint on the solution of these problems and to furnish him with such material as

he may need to become reasonably well informed on the fundamental facts of health and legislation affecting health.

After he goes to Washington the congressman should not be forgotten. One of the things which will be uppermost in his mind is the wishes and desires of the constituents whose votes at the next election he will already be seeking. The dentist, as an articulate professional man, constantly in touch with all classes of people in the community can help him there. In his daily contacts with patients and friends, the dentist will sense the reaction of the people to all kinds of issues which will be pending in Congress. The dentist should write his congressman at fairly frequent intervals and tell him what he and others are thinking about the issues of the day. The letters should be general in nature but all statements should be supported with cogent reasons for the position taken. Such letters will be read and answered and the dentist will learn that when he goes to his congressman with a problem relating to health he will listen eagerly.

Finally, the dentist should keep track of his congressman's activities in Washington and when he does a good job compliment him. The dentist should not worry if the congressman does not always vote his way. Congressmen are responsible to all of their constituents. Somehow, all dentists in the next few months should take an active part in the election and thereafter keep in touch with their congressmen.

▲

Cost of Nationalized Health Service.—Without Marshall Plan aid Britain could not afford the wholesale benefits of its new National Health Service. This year the scheme will cost nearly $1,500,000,000 or more than 10 per cent of the country's entire National budget. When in full operation it will probably cost about $2,500,000,000 a year. At the same rate a socialized scheme here would cost about ten billion dollars a year, though higher American price levels would probably push it well above that figure.—*William Alan Richardson, editor, Medical Economics, in Ohio State Medical Journal, August, 1949, quoted in Industrial Med. & Surg., September 1949, p. 26.*

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EDITORIALS

DENTISTS URGED TO COOPERATE IN DECENNIAL CENSUS OF POPULATION

IN accordance with Constitutional provision, the Seventeenth Decennial Census of Population will be taken this year, starting on April 1. Because dentists, as leaders in their community, have more than ordinary appreciation of the necessity for obtaining statistical facts about our population, the Bureau of the Census has issued a special appeal to all members of the profession to support community cooperation with the Census and to make certain that they themselves are reported correctly to the Census enumerator.

From the earliest days in our country's history, the Census has been recognized as a means of obtaining factual information on the social and economic characteristics of the population. The reports of the United States Bureau of the Census aid materially in studies being made by the Bureau of Economic Research and Statistics of the Association. Members of the profession are urged, therefore, to cooperate fully with the current survey. The more accurate the study, the more accurately can the Association determine dental needs, facilities and personnel on a national, state and local level.

The Bureau of the Census calls attention to three specific items in the 1950 questionnaire and requests dentists to answer them accurately. Under item one, "Occupation," the dentist will, of course, report himself as a member of the profession. Under item two, which refers to the type of business, the dentist should report "Dentist's Office" if he has his own office or is employed in the office of another dentist. If he spends most or all of his working time working for a hospital, school, sanitarium or business establishment, he should report himself accordingly. Under item three, which refers to the class of worker, the dentist in private practice should

be reported as being in his "own business." If he spends most or all of his time on the staff of a sanitarium, private business or government agency, he should be reported as a "private worker" or "government worker," whichever is appropriate. A dentist working for salary in the office of another dentist should be reported as a private worker.

The dentist can help further to maximize the usefulness of the Census statistics to the profession by advising the hygienist, technician and assistant on his staff to report his or her occupation clearly and specifically.

MASSACHUSETTS "DENTAL RESEARCH PROJECT": THE COMMISSIONER EXPLAINS

In this issue[1] will be found an exchange of correspondence between the Secretary of the Association and the Commissioner of Health of the Commonwealth of Massachusetts on the dental nurse training project recently inaugurated in that state. The Secretary, in opening the exchange, transmitted to the Commissioner the series of resolutions on the training of sub-level personnel which were adopted by the House of Delegates at the 1949 annual session. These resolutions are clear and are the "unhurried" and "consistent" opinions of the dental profession in this country as represented by the House of Delegates.

The Commissioner is on sound ground when he reviews the historical and statutory background of the Department of Health, but his stand is less firm when he attempts to rationalize what many have now come to recognize as a poorly planned and a poorly initiated adventure. The confusion may be only semantic, but at one point in his reply the Commissioner states that "the Department cannot seek consent from any private agency" while at another, he holds that the Department has "sought the endorsement of all interested professional groups in (its) programs." Surely, these two viewpoints are not so far apart but that a little tact and discussion on the part of the Commissioner might have reconciled whatever slight differences exist between the policies of "seeking consent" and "seeking endorsement."

The Commissioner states that the "deplorable dental health record of New England, and Massachusetts in particular, was revealed by the selective service data of World War II." Surprisingly, the Commissioner here commits himself to a *non sequitur* by saying that "as a result the armed forces were compelled to reduce their dental health standards for induction. . . ." It would be hard to believe that dental standards in the armed forces were reduced "as a result" of the findings in New England and Massachusetts when even a casual examination of the published opinions of the dental profession prior to the war would have revealed the undesirable,

1. House of Delegates Action on Dental Nurse Program Questioned by Massachusetts Commissioner of Health, p. 363.

but hardly surprising, status of dental health in the Commissioner's own state and region. Certainly this "deplorable" condition of dental health must have been known to the Commissioner when the dental profession of his state was urging an improved status for dentistry in the State Department of Health. Only in 1946, as the Commissioner points out, was such an improved status secured and then only after the State Dental Society was able to overcome considerable opposition. Massachusetts, now apparently priding itself as a pioneer in dental health planning, was one of the last states to provide itself with the indispensable tool of such planning through the creation of a dental division in the state health department. This sharp contrast between the leisurely establishment of the basic operating unit of a state dental program and the impetuous rush to get the training of dental nurses under way is one to which the Commissioner might well address himself in the interest of making an explanation that really explains.

The Commissioner argues further that "it is difficult at this time to understand the grounds on which it (the American Dental Association) logically can object to research which evaluates new methods of meeting the problem of dental disease." To keep the record clear, the Commissioner should understand that the Association does not, at this or any other time, object to the type of research mentioned provided, of course, that it is really research and not just curious tinkering masked with the prestige of research. The Association will continue to object, however, to "research projects" which cannot suffer a full and free preliminary examination and discussion as to their essential validity as real research projects. The Association, incidentally, is sending an observer experienced in public dental health to New Zealand to study the results which have been obtained in the last two decades of the "research project" being carried on in that country in the training of dental nurses.

The Commissioner finally suggests that the resolutions of the House of Delegates "may perhaps have been hurried and therefore inconsistent." The actions of the House of Delegates, the Commissioner should know, were taken after full and free discussion of all the facts with all parties concerned. There is good evidence that the Commissioner's "research project" was handled more subtly and without such full and free discussion with all interested parties. The question then arises if, perhaps, the "research project" was not the result of "hurried and therefore inconsistent" action on the part of the Department of Health. If so, the Commissioner might give some contemplative moments to a full and studied reconsideration in the interest of achieving the broad objectives to which his department, under statute, and this Association, as a voluntary organization of 68,000 of the nation's dentists, are dedicated.

THE NATIONAL SCENE

from The Journal's Washington Correspondent

Beginning in March, Congressional consideration of national health legislation is due to have its pace accelerated. All signs are that before the month's end public hearings will have been launched in the House on the Thomas-Murray-Dingell, Bosone and Javits-Herter bills on health insurance in various forms. While the holding of Senate hearings on the recently introduced Hunt bill is improbable, the fact that a comprehensive report on health legislation proposals is scheduled to be made this month by the Senate subcommittee headed by Senator James E. Murray (Mont.) lends assurance that the subject will be a warm one on that side of the Capitol as well.

President Truman's proclamation of February 6 as National Children's Dental Health Day just about sums up Washington's record of accomplishment for the first two months of 1950, as far as health affairs are concerned. Still awaiting action by the House is the important matter of federal aid to medical and dental schools, together with the proposed establishment of government scholarships. Another pending question is whether Congress will appropriate funds to begin construction of a building to house the National Dental Research Institute. Government support of dental research in non-federal institutions will be increased or lowered in 1950-51, depending upon action taken by Congress this spring.

Dental Appropriations

Questioning and testimony at House hearings in January on dental appropriations shed considerable light on the thinking of Congress members and brought to light a number of interesting facts. The hearings were in closed session but the printed transcripts were made public in February. For example, when Drs. H. Trendley Dean and Norman Topping testified that the National Institute of Dental Research would be seriously handicapped if ample laboratory space were not provided for it, Representative Frank B. Keefe (R., Wis.) commented:

"The actual money (for construction) was not provided because the planning had to be provided initially and the Congress appropriated $100,000 to be transferred to Public Buildings Administration to prepare the plans for that building. Dr. Dean (director of the Institute) has now testified that those plans are nearing completion. If those plans are abandoned, then we have put $100,000 into the rat hole, so to speak. That is a rather sad commentary upon the wisdom of Congress, if the opinion of the Bureau of the Budget ultimately prevails."

It was the Budget Bureau that withheld approval of the construction item. This is not binding upon Congress, however, which may appropriate any amount it sees fit, up to the authorized limit, to build the project at suburban Bethesda, Md.

Sodium Fluoride Effects

Other testimony by Dr. Dean, Surgeon General Leonard A. Scheele, Dr. Bruce D. Forsyth and Dr. John W. Knutson, all representing the U. S. Public Health Service, developed the following points: Sodium fluoride demonstrations have

been conducted to date in 454 communities, 257 of which have set up continuing programs. Thirty-nine USPHS mobile units are in the field at a cost of $817,000 for the current year, with $773,000 proposed to be spent on this work in 1950-51.

Before the end of this year, a report is scheduled to be made on clinical studies of the effect of topical application of sodium fluoride to adults' teeth.

Keefe and Advertising

Representative Keefe, who probably is the foremost Congressional crusader against nostrums and false advertising of medicinals, gave expression to his skepticism of "irium" and dentifrices bearing special claims when he said "I suppose we can rely upon the old maxim 'caveat emptor' but it does seem at the present time we are subjecting the population of the country to a pretty well organized system of propaganda and advertising which leads the public to believe clinical studies have been made, proven and established on this, that and the other, which I have been unable to isolate and put my finger on. Well, at least they taste good."

The Hunt Bill

Reverting briefly to the national health bill sponsored by Senator Lester C. Hunt (Democrat, Wyoming), the chagrin of Rep. Albert Thomas (D., Tex.) was unconcealed when his colleague, Senator Murray, informed the press that hearings on the dentist-legislator's measure probably would not be scheduled. Dr. Hunt communicated promptly with Sen. Elbert D. Thomas (Dem., Utah), chairman of the Senate Labor and Public Welfare Committee—of which the Murray subcommittee on health legislation is a part—and was assured that no bill providing for health insurance would be approved by the full committee before ample consideration had been given to the Hunt bill (S.2940). Whether Senator Hunt will seek to have an identical companion bill introduced in the House, thereby assuring for the plan a public airing when that branch of Congress conducts hearings this spring, apparently is still undecided.

Admiral Rault Retires

Recent announcement by the Navy Department that Rear Admiral Clemens V. Rault will retire, effective July 1, from active duty to become dean of Georgetown University Dental School launched a wave of speculation as to his successor as Assistant Chief of the Bureau of Medicine and Surgery in charge of dental activities. Rear Admiral Spry Clayter, now stationed in San Francisco as chief dental officer for the Twelfth Naval District, is believed to be the leading candidate for the post which Admiral Rault is leaving.

Edward G. Hampp, senior research associate of the American Dental Association and who has been attached to the National Institutes of Health since 1941, has been selected for the annual award for proficiency and accomplishment in the biological sciences conferred by the Washington Academy of Sciences. The selection was in recognition of Dr. Hampp's contributions to knowledge of diseases of the oral cavity, with particular reference to his isolation of *Borrelia vincentii* in pure culture. The presentation is to be made on March 16 at the Cosmos Club in Washington.

Jacob M. Wisan Named Chief Dental Officer, V.A. Hospital

Jacob M. Wisan, director of Joseph Samuels Dental Clinic in Providence, R. I., has resigned that position to become chief dental officer of the new veterans' hospital at Ft. Hamilton in Brooklyn, N. Y. Dr. Wisan assumes his new position with the Veterans Administration March. 1.

A. D. A. AFFAIRS

BOARD OF TRUSTEES HOLDS ANNUAL MIDWINTER MEETING IN CHICAGO FEBRUARY 6-7

The midwinter meeting of the Board of Trustees of the American Dental Association was held in the Central Office February 6 and 7. The following officers and members of the Board of Trustees were in attendance: Philip E. Adams, president; Harold W. Oppice, president-elect; Bernard C. Kingsbury, first vice-president; Don M. Hamm, second vice-president; Gerald G. Burns, third vice-president; Percy T. Phillips, speaker, House of Delegates; Harold Hillenbrand, secretary; H. B. Washburn, treasurer; C. Willard Camalier, assistant secretary; L. M. Cruttenden, assistant secretary; John J. Hollister, business manager; Lon W. Morrey, editor; J. B. Carr, R. C. Dalgleish, LeRoy M. Ennis, C. S. Foster, L. H. Jacob, James E. John, George LeSage, Daniel F. Lynch, Willard Ogle, Fred S. Shandley, Charles I. Taggart and Robert P. Thomas. George LeSage, from District Nine, served for Obed H. Moen who was absent because of illness.

A new section of the Bylaws, added at the annual session in San Francisco, makes it mandatory for the President of the Association to appoint a substitute when it is known in advance that a member of the Board will be unable to be present for a regular or special session.

Massachusetts Program for Training of Auxiliary Personnel

The Board reviewed the correspondence between Dr. Vlado A. Getting, Commissioner of Health, Department of Health of Massachusetts and Secretary Hillenbrand regarding the program to train dental nurses. The Board directed that the correspondence plus an editorial explanation of the Association position in the matter, be published in THE JOURNAL. (Page 363.)

National Board of Dental Examiners

The Board approved a recommendation to transfer the records and files of the Council on National Board of Dental Examiners to the Central Office in Chicago where clerical assistance will be provided for its activities. Thomas M. Birkbeck of Oregon was appointed chairman of the council. Larry Dupuy of Louisiana, M. S. Smith of New Mexico and Philip Swartz of New Jersey were appointed consultants to that agency.

World Health Organization

In an effort to stimulate the World Health Organization to give more attention to the problems associated with dental disorders, the Trustees passed a resolution "to request the Surgeon General of the Public Health Service to use his influence with W.H.O. with the view to the establishment, at the earliest possible date, of a dental health unit and the appointment of an advisory committee in order to bring eventually to all portions of the world the highest standards in dental education and practice.

Hospital Dental Service

The Board appropriated the additional sum of $1,415 to the Council on Hospital Dental Service to defray the cost of clerical work of the Committee on Interneships and Residency Programs and for the inspection of hospitals.

Dental Education

At the request of the Council on Dental Education, the Board approved the appointment of the following men as consultants and advisors to the Committee on Aptitude Testing of the council: Leroy R. Boling, School of Dentistry, Washington University; James Henry Burrill, Dental School, Northwestern University; Max D. Engelhart, Examiner, Chicago City Junior Colleges; B. Franklin Gurney, Chicago College of Dental Surgery, Loyola University, Chicago; Palmer O. Johnson, College of Education, University of Minnesota; John Vernon Lenburg, Dental School, Northwestern University; Everet Franklin Lindquist, University of Iowa; Clarence M. Peebles, Dental School, Northwestern University; Francis X. Pelka, School of Dentistry, University of Illinois; Ted Franz Pett, Dental School, Northwestern University; Gustav William Rapp, Chicago College of Dental Surgery, Loyola University, Chicago; Ralph W. Tyler, University of Chicago; Robert B. Underwood, School of Dentistry, University of Illinois, and Samuel C. Webb, School of Dentistry, Emory University.

Bureau of Economic Research and Statistics

The Bureau of Economic Research and Statistics was authorized by the Board to initiate efforts to secure I.B.M. cards related to the dental profession from the Bureau of the Census. These cards, prepared from the data collected from the 1950 census, will contain information valuable to the profession on dental personnel, including such items as race, age, distribution and average weekly working hours. The Bureau was also instructed to investigate the possibility of having the Bureau of the Census include dental questions occasionally in its monthly sample surveys.

Building Improvements

The Board approved the request that $23,227 be appropriated on a capital basis for alteration and improvements in the basement and on the first and second floors of the Central Office. These improvements are necessary to accommodate the expansion of the Central Office during the past few years.

Reception for Essayists and Clinicians

In conformance with the action taken by the House of Delegates which approved the principle that the Council on Scientific Sessions provide some entertainment for essayists and clinicians, the Board appropriated $500 for the purpose of giving a reception for essayists and clinicians and their wives during the 1950 annual session.

Section Secretaries

The Board directed the Council on Constitution and Bylaws to prepare an amendment to the Bylaws, deleting the office of section secretaries, the Section on Dental Education and the Section on Hospital Dental Services.

The appointment of the following list of section officers was approved by the Board:

Section on Clinics

Walter Buchmann, 25 East Washington St., Chicago, Ill., chairman
Marcus H. Burton, 1149—16th St. N.E., Washington, D. C., vice chairman
Roland E. Morse, 14 W. 49th St., New York, N. Y., secretary

Section on Full Denture Prosthesis

A. H. Grunewald, Naval Dental School, NNMC, Bethesda, Md., chairman

T. A. Bodine, Akron Savings and Loan Bldg., Akron, Ohio, vice chairman
B. W. Oesterling, Naval Dental School, NNMC, Bethesda, Md., secretary

Section on Operative Dentistry

O. B. Coomer, Heyburn Bldg., Louisville, Ky., chairman
Rex Ingraham, 122 E. 16th St., Los Angeles, Calif., vice chairman
Gerald D. Stibbs, School of Dent., Univ. of Wash., Seattle, Wash., secretary

Section on Oral Surgery

V. H. Eman, 622 Medical Arts Bldg., Grand Rapids, Mich., chairman
James R. Cameron, 269 S. 19th St., Philadelphia 3, Pa., vice chairman
H. N. Brownson, 7046 Hollywood Blvd., Hollywood, Calif., secretary

Section on Orthodontics

George S. Callaway, 654 Madison Ave., New York, N. Y., chairman
J. Williams Adams, 1121 W. Michigan St., Indianapolis, Ind., vice chairman
Glenn H. Whitson, 80 Hanson Place, Brooklyn 17, N. Y., secretary

Section on Partial Denture Prosthesis

Lewis W. Thom, 1546 Medical Arts Bldg., Minneapolis, Minn., chairman
Paul Edmand, 3304, 55 E. Washington St., Chicago, Ill., vice chairman
Alfred C. Young, 121 University Place, Pittsburgh, Pa., secretary

Section on Pedodontics and Oral Hygiene

John Chrietzberg, 222½ S. Fourth St., Springfield, Ill., chairman
George W. Teuscher, 311 E. Chicago Ave., Chicago, Ill., vice chairman
William Jordan, Minn. State Depart. of Health, Univ. of Minn. Campus, Minneapolis 14, Minn., secretary

Section on Periodontia

Harold G. Ray, Univ. of Calif., Coll. of Dent., San Francisco, Calif., chairman
Roy O. Elam, 605 Medical Arts Bldg., Nashville, Tenn., vice chairman
Walter Leabo, 706 Medical Arts Bldg., Shreveport, La., secretary

Section on Research

F. A. Arnold, National Institute of Health, Bethesda, Md., chairman
S. F. Bradel, 55 E. Washington St., Chicago, Ill., vice chairman
Helmut Zander, Tufts Coll. Dental School, 416 Huntington Ave., Boston, Mass., secretary

Section on Roentgenology

Gordon M. Fitzgerald, Coll. of Dent., Univ. of Calif., San Francisco, Calif., chairman
L. R. Main, School of Dent., Univ. of St. Louis, St. Louis, Mo., vice chairman
W. J. Updegrave, 230 W. Duncannon Ave., Philadelphia, Pa., secretary

Section on Practice Management

Lloyd H. Dodd, 860 Citizens Bldg., Decatur 30, Ill., chairman
Cecil H. Bliss, 503 Fifth St., Sioux City, Iowa, vice chairman
Gaylord J. James, 9400 Euclid Ave., Cleveland 6, Ohio, secretary

Section on Scientific Exhibits

Hermann Becks, 2240 Channing Way, Berkeley, Calif., chairman
J. M. Wisan, Joseph Samuels Dental Clinic, Rhode Island Hospitals, Providence, R. I., vice chairman
J. L. Bernier, Lt. Col., Registry of Dental Oral Pathology, Army Medical Museum, Washington, D. C., secretary

American Dental Foundation

Inasmuch as the American Dental Foundation, established in 1930, has been comparatively inactive throughout its existence, and in as much as its reorganization would entail considerable expense, the Board authorized the Secretary to take the necessary steps to dissolve the organization and place its recoverable assets in the Association research fund.

State Speakers Bureau

In order to clarify confusion which seems to prevail in some state societies regarding the services of the State Speakers Bureau, which was approved by the House of Delegates last October, the Board instructed the Secretary to inform constituent societies that the President's expenses to official meetings of state societies will be cared for by the Association outside of the budget provided for the state speakers' program.

Council on Legislation

Because of the increasing amount of research work which the Council on Legislation is undertaking with respect to state and federal laws, administrative regulations and court decisions the Board made an appropriation to the Council for the employment during 1950 of a full time legislative assistant to the Secretary of the Council.

Council on Federal Government Dental Services

The Board approved the appointment of Harry Lyons of Virginia as consultant to the Council on Federal Government Dental Services, and it authorized the Council to investigate the possibility of establishing a machine record system for inventorying dental manpower statistics for use in a future national emergency. The board also appropriated an additional $1,500 for use of the Council.

Dental Health Consultant

In order to stimulate the development of state and community dental health programs, the Board approved the recommendation that a full time dental health consultant be employed and it appropriated $10,500 for that purpose.

National Health Council

The Board appropriated $500 for a voluntary contribution to the National Health Council, of which the Association is a member. Harold Hillenbrand and R. C. Dalgleish were named as additional candidates to serve with Allen O. Gruebbel on the Board of Directors of the Council.

Journal of Oral Surgery

The Board, acting on the recommendation of the Committee of the Journal of Oral Surgery of the American Society of Oral Surgeons, appointed the following men as members of the Editorial Board of the Journal of Oral Surgery: Don H. Bellinger, Detroit; H. Newman Brownson, Hollywood, Calif.; James R. Cameron, Philadelphia; Reed O. Dingman, Ann Arbor, Mich.; William E. Durbeck, San Antonio; G. Thaddeus Gregory, Indianapolis; Howard C. Miller, Chicago, and Lon W. Morrey, Chicago.

Council on Journalism

The Board approved the program of the Council on Journalism for the establishment of standards covering the objectives, support, administration and technics of publication for constituent society publications.

Council on Dental Therapeutics

The Board approved the revised policy of the Council on Dental Therapeutics covering the Provisions for Acceptance of Products by the Council. The full text of these provisions will be published in a later issue of THE JOURNAL. The following list of consultants to the Council on Dental Therapeutics was approved: Donald H. Bellinger, Detroit; Mary C. Crowley, Ann Arbor, Mich.; Irving Glickman, Boston; Jay Philip, Ann Arbor, Mich.; Paul C. Kitchin, Columbus, Ohio; Holmes T. Knighton, St. Louis; Isaac Schour, Chicago; J. F. Volker, Birmingham, Ala.; H. B. Washburn, St. Paul and Ned B. Williams, Philadelphia.

Reimbursements

A special committee was appointed to develop a program whereby constituent and component societies might be reimbursed in whole or in part for the loss of revenue incurred while acting as hosts to an annual session of the Association. This committee will report to the Board next October.

Guests

Bion R. East, Assistant Chief Medical Director for Dental Services, Veterans Administration, J. Hennecker and Daniel Rosen, also of the V.A. were present and invited the American Dental Association to participate in studies of the V.A. outpatient program. The representatives distributed binders to the Board members which contained material dealing with problems encountered with the dental outpatient system of the V.A.

Dr. Birger Nygaard-Ostby, President of the Norwegian Dental Association, who is visiting several of the dental schools in this country, was introduced to the Board members and brought greetings from his organization. He was invited to sit in and witness administrative procedures of the Board of Trustees.

APPOINT NEW EDITORIAL, BUSINESS OFFICE ASSISTANTS

Mr. Walter A. Suberg, of Chicago, has been named assistant business manager of the A.D.A. Central Office, and Mr. David J. Atchison, of Elgin, Ill., has been appointed assistant editor, both men having assumed their duties in January.

Mr. Suberg, who replaces Mr. Joseph J. Richards, formerly was director of purchases for the U. S. Sanitary Specialties Corporation in Chicago. During the war, he served as an Air Force captain.

Mr. Atchison, who succeeds Mr. John L. Murphy, formerly was magazine relations director of the American Medical Association and was associate editor of *Nowadays* magazine supplement. He is the son of a veteran Elgin dentist, George B. Atchison.

A.D.A. JOINS THE NATIONAL HEALTH COUNCIL

The A.D.A. last month became the twenty-second association to assume active membership in the National Health Council, an agency of volunteer groups designed to coordinate public health activities on a national, state and local basis.

The A.D.A. has named Allen O. Gruebbel, secretary of the Council on Dental Health, as the Association's official delegate to the Council.

A.D.A. PRESIDENT ENDORSES RED CROSS DRIVE

Philip E. Adams, A.D.A. president, has given endorsement to the American Red Cross drive, which is scheduled to begin this month. In a letter to Gen. George C. Marshall, A.R.C. president, Dr. Adams pointed out that "members of the dental profession, like others concerned with health, are acutely aware of

the Red Cross in the maintenance of the health and well-being of the people." Dr. Adams has urged all dentists to support the Red Cross appeal for vitally necessary funds.

TRUMAN'S PROCLAMATION BOOSTS CHILDREN'S DENTAL HEALTH DAY

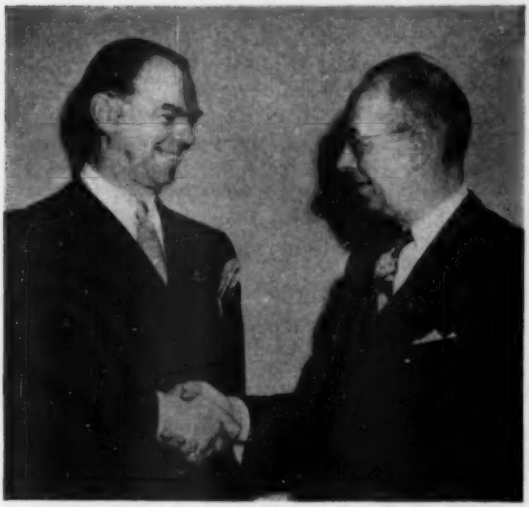
On February 1, in special ceremonies at the White House, President Truman signed an A.D.A. sponsored proclamation urging "the fundamental necessity of a continuous program for the protection and development of the dental health of the nation's children," and named February 6 as National Children's Dental Health Day.

The resolution came as a climax to House action on January 27, spearheaded by Rep. Michael A. Feighan (D., Ohio) and Joseph R. Bryson (D., S. C.). The resolution was originally approved by the House last year, and brought up in the current session of the Senate. It was urged for passage by Majority Leader Scott Lucas (Ill.), and supported by Senators Herbert R. O'Conor (Md.), James E. Murray (Mont.), Pat McCarran (Nev.) and Lester C. Hunt (Wyo.).

As it was finally adopted, the resolution authorized "the President of the United States to issue a proclamation setting aside February 6, 1950, as National Children's Dental Health Day and to invite all agencies and organizations interested in child welfare to unite upon that day in the observance of such exercise as will call to the attention of the people of the United States the fundamental necessity" of a dental health program for children.

The proclamation added considerable impetus to the extensive state and community programs sponsored by dental societies in the observance of the day.

Among the legislators and A.D.A. representatives present when President Truman signed the proclamation designating February 6, as National Children's Dental Health Day were: (L. to R.) Dr. H. E. Kelly, Cleveland Dental Society; Hon. Michael A. Feighan, Congressman from Cleveland, Ohio, and author of the resolution; Dr. Bruce D. Forsyth, Assistant Surgeon General and Chief Dental Officer, U. S. Public Health Service; Dr. Philip E. Adams, President, A.D.A., Boston, Mass.; Hon. John W. McCormack, Majority Floor Leader, House of Representatives; Dr. Thomas J. McDermott, member of the A.D.A. Council on Legislation, Cleveland, and Dr. C. Willard Camalier, Washington, D. C.



Dr. Birger Nygaard-Ostby, President of the Norwegian Dental Association (l.) is shown greeting Philip E. Adams, A.D.A. President in Chicago last month. Dr. Nygaard-Ostby, who is in this country inspecting dental schools, brought greetings from his group to A.D.A. members.

COUNCILS ACT ON PERTINENT ISSUES IN FEBRUARY MEETINGS

February 6 to 11 saw many A.D.A. Councils in session at the Central Office, during which time a great number of issues pertinent to the dental profession were acted upon.

The Council on Legislation completed plans for the publication of a news bulletin devoted exclusively to reporting legislative developments in the national and state capitals. The Council also endorsed a bill (S. 2541) which would authorize advanced training courses for dentists in the Veterans Administration.

The Council on Scientific Session met with the section officers approved by the Board of Trustees, and voted to prepare and distribute a manual on the conduct of section meetings to all section officers. This council approved the idea of naming the 1950 session the "Midcentury Meeting." Also approved was the plan for a reception for essayists, clinicians and scientific exhibitors on the Monday evening the session opens.

The Council on Federal Government Dental Services developed a plan for districting the various states and assigning one member of the Council for purposes of liaison and information directly with the State Military Affairs chairmen.

DENTAL HEALTH PROGRAM AVAILABLE FOR DISTRIBUTION

Copies of the statement, "A Dental Health Program for the Community, State and Nation," which was approved unanimously by the House of Delegates at the 90th annual session last October, are now available without cost to individual dental societies.

The pamphlet contains the constructive proposal of the dental profession for the establishment of programs for the improvement of dental health in the United States and deserves the widest possible distribution. The A.D.A. Bureau of Public Information, in a letter to dental society secretaries, suggests a possible distribution to members of legislatures, city councils, school boards and health boards, officials of welfare and civic

groups, officers of professional organizations and civic leaders, and to libraries, schools and similar institutions within their respective jurisdiction.

In Washington, the statement was considered of sufficient importance to include it in the Congressional Record of January 26. Congressman Brehm, of Ohio, was responsible for its insertion which starts on page A-574 of the Record.

COMMITTEE ON APTITUDE TESTING PLANS 1951 PROGRAM

Specific plans for conducting aptitude tests for dental school applicants were reviewed and approved by the Council on Dental Education at its February 3rd meeting in the A.D.A. Central Office. The Council's Committee on Aptitude Testing, under Chairman Otto Brandhorst, met to discuss the conduct of the tests on a national basis.

TESTING METHODS DISCUSSED IN CHICAGO SEMINAR

Testing technics and their application to licensure examinations was the topic under discussion at the second seminar on testing methods, held in Chicago on Sunday, February 5, at the Palmer House. The first such meeting was held in San Francisco last year.

Philip L. Schwartz, vice-president of the American Association of Dental Examiners, acted as general chairman of the meeting which featured round table discussions moderated by Shailer Peterson, Secretary of the A.D.A. Council on Dental Education. Participants included W. A. Wilson, Secretary of the New Jersey State Board of Registration and Examination in Dentistry; Gustav W. Rapp, Chairman and Director of the Department of Research, Loyola University, Chicago; Max D. Engelhart, Examiner, Chicago City Junior Colleges, and Lloyd E. Blauch, Associate Chief for Education in Health Professions, U. S. Office of Education. William Hered and Edgar Friedenberg, of the Board of Examinations, University of Chicago, also appeared on the program.

Following the round table discussion three groups were formed which met in different rooms of the hotel to discuss specific problems with test experts from the Chicago area and teachers from various dental schools.

DENTAL EDUCATORS HOLD SIXTH CONGRESS IN CHICAGO

The Sixth Congress on Dental Education and Licensure met at the Stevens Hotel in Chicago February 4, to discuss the topic "Preprofessional Education."

Sponsored by the A.D.A.'s Council on Dental Education, the Sixth Congress featured papers on the topic of preprofessional education from the standpoint of secondary schooling, and the role of higher education in predental training. Each participant discussed the general problems as he had experienced them and suggested changes in college curricula that might better prepare the student for dental school and later practice.

The role of secondary education in preparing for the dental profession were presented by Maynard K. Hine, Dean, School of Dentistry of Indiana University; Henry A. Swanson of the American Association of Dental Examiners, and two Chicago-suburban high school superintendents.

Higher preprofessional education was discussed by Kenneth W. Lund, veterans' counselor of Wright Junior College; Willard C. Fleming, Dean, College of Dentistry, University of California; Charles I. Taggart, A.D.A. Trustee and a member of the Vermont Board of Dental Examiners, and Carlyle Jacobsen, Executive Dean, Division of Health Sciences and Services, University of Iowa.

DENTAL SOCIETIES

CALIFORNIA SOCIETIES HOLD FIRST DENTAL HEALTH FORUMS

With the purpose of demonstrating to the public that the dental profession is definitely interested in contributing its knowledge toward a healthier community, the 18 components of the California State Dental Association launched the first annual meeting of the Children's Dental Health Conference on February 6.

Held at the St. Francis Hotel in San Francisco, the conference was planned to coincide with National Children's Dental Health Day, the program dealing almost entirely with children's dental problems, and means of preventing and treating them.

Seven separate speakers held morning symposiums in various meeting rooms in the hotel. During the afternoon, the eighteen districts held table clinics in the Italian Room, while the University dental schools conducted similar clinics simultaneously at other locations in the hotel.

The California society's goal was put in words by Hugo M. Kulstad, Chief of the Division of Dental Health, State Department of Health, when he stated "Let's make children's dental health a reality—by concerted and cooperative effort throughout the State of California and the nation. This is our challenge, our purpose and our goal."

CONNECTICUT DENTAL HEALTH CONFERENCE HELD IN HARTFORD

With the theme, "Extension of Dental Care to All Groups," the Connecticut Dental Health Conference convened at the Hotel Bond on January 14 for a two-day session designed to plan more comprehensive dental services for the people of their state.

Sponsored by the state society's Council on Dental Health, the purpose of the conference, like its predecessor, the Dental Health Workshop, was to study the dental care problems of Connecticut residents and to formulate workable plans to handle these problems. Discussion topics included "Caries Control," "Extension of Dental Care Programs" and "Public Relations and Dentists' Education for Same."

Additional recommendations made by the conference, when adopted by the Connecticut State Dental Association, will become its policies.

NEW JERSEY DENTISTS STUDY ORAL CANCER IN STATE PROGRAM

The New Jersey State Department of Health and the State Dental Society jointly are sponsoring courses in oral cancer for practicing New Jersey dentists, through funds made available to the Section on Dental Diseases of the State Department of Health from federal funds assigned to the Section on Cancer Control.

Each local component dental society selected a minimum of two of its members to participate in these courses. Twenty dentists were assigned to the New York University College of Dentistry and Bellevue Hospital for a five-day, full-time course in diagnosis and treatment of benign and malignant oral lesions, from January 9th through 13th.

Twenty practicing New Jersey dentists were also assigned to the Thomas W. Evans Institute, University of Pennsylvania School of Dentistry and the American Oncologic Hospital for a five-day, full-time course in the diagnosis and treatment of benign and malignant oral lesions, from January 16th through 20th.

The dentists participating in these

courses are expected to arouse and sustain the interest of the members of their local component dental societies in the early recognition of oral neoplastic disease. The course at New York University will be repeated the week of May 8th through 12th, and at the University of Pennsylvania the week of May 15th through 19th, for two more groups of New Jersey dentists.

CHICAGO SOCIETY MIDWINTER MEETING ACCLAIMED

The annual Midwinter Meeting of the Chicago Dental Society, held at the Stevens Hotel February 6 to 9, saw a total of 11,809 persons attending. Of this figure, 2,777 were Chicago dentists.

The meeting, which opened on National Children's Dental Health Day, registered 3,305 A.D.A. members from out of the city. More than 5,700 medical and lay guests attended the meetings and observed the nine scientific and 201 commercial exhibits.

NEW YORK DENTISTS APPOINT COMPULSORY HEALTH COMMITTEE

The Dental Society of the State of New York has set up a special committee for the purpose of educating members on the workings of a possible Compulsory Health Insurance Law.

The Compulsory Health Committee consists of a chairman appointed by the president and 10 selected men who act as chairmen of the state's 10 district dental societies. Of these 10 district chairmen, three are designated as section chairmen, each administering the program in his own district and in two or three nearby districts.

A special and extra meeting was held in each district, with the program devoted to Compulsory Health Insurance and its ramifications in the dental profession.

A committee has been organized in each district with the express purpose of getting the membership out to meetings, supplying of speakers for lay groups and distributing information at a local level. The state society underwrites the expenses of the state chairman, speakers and the three section chairmen, while the district societies pay expenses for their chairmen and stand the costs of conducting special local meetings.

ARIZONA SOCIETY TO MEET AT GRAND CANYON IN APRIL

The Arizona State Dental Society will establish a precedent on April 20 when members convene at an appropriate location for their profession—on the brink of the Grand Canyon.

H. G. DeWolf, Secretary-Treasurer of the Arizona Society, has issued a cordial invitation to all interested dentists to attend the three-day session with the object of combining a "spring vacation, a good trip and the opportunity to attend a small but very good meeting."

WISCONSIN SOCIETY IN 80TH SESSION AT MILWAUKEE, APRIL 11

Practitioners from all sections of the state will participate in discussions and clinics presenting latest advancements in dentistry, at the 80th Annual Convention of the Wisconsin State Dental Society to be held in the Milwaukee Auditorium, April 11 through 13.

Sen. Lester C. Hunt of Wyoming, the only dentist at present in the U. S. Senate, will address members at the annual luncheon on Tuesday, April 11. Scientific and health exhibits will be on display during the entire session. These may be viewed by the general public without

charge every day from 9 a.m. to 5 p.m. during the meeting.

Affiliated organizations participating in the meeting will be the Women's Auxiliary, Wisconsin Dental Assistants' Association and Wisconsin Dental Hygienists' Association.

A registration of over 2,500 is expected.

HINMAN MID-WINTER CLINIC SCHEDULED FOR MARCH 20-23

The Thomas P. Hinman mid-winter clinic will be held March 20-23, in Atlanta, Ga., according to Sidney L. Davis, chairman of the annual dental meeting.

Major speakers on the program include Philip E. Adams, A.D.A. president, Senator Lester C. Hunt (D., Wyo.), only dentist serving in the U. S. Senate and author of a plan to promote a system of voluntary federal health insurance, Clyde E. Minges, immediate past-president of the A.D.A., and Ralph McGill, editor of the Atlanta Constitution. Reservations may be secured by writing R. D. Robinson, 832 Candler Building, Atlanta.

LEGISLATION

SENATOR HUNT INTRODUCES NEW HEALTH BILL IN CONGRESS

Sen. Lester C. Hunt (D. Wyo.), the only dentist in the U. S. Senate, introduced a bill (S. 2490) on January 30 which would provide health benefits for families with less than $5,000 annual income who voluntarily join the program.

The bill calls for the creation of a federal department of health, directed by either a physician or a dentist, and would establish a National Health Insurance Board to carry out the program. All wage-earners in the below $5,000 category would be eligible for reimbursement of all dental, medical and hospital expenses paid out in any amount over the first $5.00. The $5.00 deductible provision was included to discourage unnecessary visits to dentists and physicians.

In introducing his bill, Senator Hunt, a member of the A.D.A., said that it was designed primarily to "provide maximum health coverage to the lower income groups at a minimum premium" with the feature that it carries no compulsory objective and "does not, in any sense of the word, socialize the health professions."

The Hunt bill would also provide for federal grants and loans to set up farmers' experimental health cooperatives and health facilities in rural and other areas lacking such care.

Copies of the Hunt Bill were submitted to the A.D.A. and the A.M.A. for consideration. It was the third health bill before Congress in February.

A.D.A. LISTED IN LOBBYING REPORTS TO CONGRESS

Final lobbying reports received by the Clerk of the House listed A.D.A. expenditures as $15,407 for 1949, as compared to the American Medical Association's lobbying coffer of $2,290,045. The A.M.A.'s expenditures for the year amounted to $1,522,683.

The A.M.A. figure included fourth quarter contributions, the $25 assessment of members, which brought $95,853 to the fund. The A.D.A. levied no assessment on members.

Included among the list of organizations active in following health and medical legislation were the American Hospital Association with $53,726 and the American Osteopathic Association with $14,646. The American Parents Committee received contributions amounting to $18,518 during the year and spent a total of $17,033.

NEW YORK ASSEMBLY BILL WOULD DELETE DENTAL CARE

New York Assembly Bill 144 was referred to the Committee on Social Welfare early in January, as an amendment to the section of the Social Welfare Law of New York. This law pertains to the character of home relief.

The section would be amended to include a proviso limiting the maximum weekly amount granted to a person for home relief to the maximum amount payable for total disability under the Workman's Compensation Law. The proviso specifically excludes, however, the cost of medical, dental and nursing care, drugs, medical material and supplies from the maximum amount payable for such home relief.

DENTAL EDUCATION

DENTAL SCHOOL AT GEORGETOWN APPROVED BY A.D.A. COUNCIL

The School of Dentistry, Georgetown University, is now approved by the A.D.A., resulting from the action taken by the Council on Dental Education at its February 3 meeting.

The announcement of the school's approval was made a week prior to Dean John P. Burke's decision to return to private practice. Dr. Burke has been continually associated with the school for the past 24 years, and in the capacity of dean since 1944.

Dr. Burke will be succeeded by Rear Admiral Clemens V. Rault, whose appointment as dean of the School of Dentistry will become effective July 1.

ADMIRAL RAULT NAMED DEAN OF GEORGETOWN DENTAL SCHOOL

Rear Admiral Clemens V. Rault, chief of the Dental Division, U. S. Navy since 1948, will become dean of the Georgetown University School of Dentistry on July 1, succeeding John P. Burke.

Admiral Rault has served with the Navy Dental Corps since his graduation from Loyola University School of Dentistry, New Orleans, in 1918, with both foreign and domestic tours of duty. He has also served as an instructor in Oral Surgery and Oral Hygiene on the faculties of the Naval Dental School and Georgetown University.

Dr. Burke, a member of the A.D.A. for more than 30 years, is resigning to return to private practice on a full-time basis.

JOHN C. BRAUER APPOINTED DEAN OF NEW N. C. SCHOOL

John C. Brauer, formerly dean of the University of Southern California School of Dentistry, has been appointed dean of the new School of Dentistry, University of North Carolina, at Chapel Hill.

Dr. Brauer will oversee construction plans for the new building program. The first freshman class will be admitted to the new dental school facilities in September of this year.

TWO DAY PUBLIC HEALTH COURSE AT TEMPLE UNIVERSITY

A course designed to increase efficiency in children's dentistry and public health dental clinic practices will be offered by Temple University School of Dentistry, Philadelphia, March 14 and 15.

The two day course will be given in

cooperation with the Conference on Dental Clinics and Pennsylvania State Department of Health. Ernest F. Ritsert will act as moderator in the lecture-discussions of such subjects as preventive orthodontics, surgical procedures with exodontia and anesthesia for children, and radiographic technics and interpretation. A panel of authorities in various fields of public health and children's dentistry will present the lectures.

The course will be given without charge, but will be limited to 50 active members of a dental clinic staff in Pennsylvania and members of the A.D.A. Applications should be addressed to Dr. Ritsert at the Temple University School of Dentistry, Philadelphia 40.

PUBLIC HEALTH

DENTAL CARE IN SCHOOLS OBJECT OF BALTIMORE PROGRAM

The provision for early recognition of dental caries in childhood and effective treatment at that stage, will be one of the prime objectives of the newly-formed Bureau of Dental Care in the Baltimore Health Department.

Under the direction of H. Burton McCauley, the Bureau of Dental Care will expand the dental program for Baltimore's school children as recommended by the City Medical Care Committee's special study. This committee recommended two specific programs, a long-range one for school-age children and one for the emergency care of persons with low income, with a 10-year budget for the work. Results of the study showed dental caries to be the most prevalent disease needing immediate treatment.

Last November, Baltimore's Mayor Thomas D'Alesandro appointed a new Dental Advisory Committee to assist the City Health Department in the inauguration and conduct of the program, naming three members of the Baltimore Dental Society: George M. Anderson, member of the Maryland State Board of Health; M. Edward Coberth, Assistant Professor of Pedodontics at the Dental School, University of Maryland; and Edward D. Stone, Jr., chairman of the local society's committee for the children's program.

ILLINOIS LAUNCHES THIRD MOBILE DENTAL UNIT

The third mobile dental unit in Illinois began operating in Alexander and Pulaski counties at the close of 1949, with complete facilities for examination and treatment.

The new dental unit, in charge of Douglas John Sanders, is equipped for x-rays, examinations, applications of sodium fluoride to the teeth, corrective treatment and general dental services. The unit became a reality to Alexander-Pulaski counties through the efforts of the bi-county Board of Health working with Howard Moreland, member of the Illinois State Dental Society's Council on Dental Health.

Other Illinois county areas that maintain "rolling" dental services are Peoria County and the Quadri-County Health Department's area (Johnson, Pope, Hardin and Massac counties).

PAMPHLETS ON MOUTH CANCER PUBLISHED BY F.S.A.

False beliefs and actual facts are dealt with in the first five of a series of popular pamphlets on cancer now available through the National Cancer Institute of the Federal Security Agency.

Subjects covered are cancer in general,

cancer of the breast, of the female reproductive organs, of the digestive tract and, of importance to dentists and their patients, cancer of the mouth and respiratory tract. The latter booklet covers areas accessible to the dentist—the lips, gums, cheek and tongue—and describes the first danger signs.

According to Surgeon General Leonard A. Scheele of the Public Health Service, the pamphlets were published in response to a widespread demand for a simple, clear explanation of what cancer is and the protection against it.

PUBLIC INVITED TO BOSTON DENTAL HEALTH FORUMS

The final lecture in a series of ten dental health forums will be held Sunday, March 5, at the Forsyth Dental Infirmary for Children, in Boston. Open to the public, the series began on January 8 under the auspices of the Massachusetts Dental Society.

Subjects for the lectures were chosen especially for their interest to the public, and such topics were covered as the care and preservation of children's teeth, the effects of diet on teeth, tooth x-rays and dentures.

Stephen Mallett, past president of the Massachusetts Society, conceived the idea during his term of office three years ago and has been active in promoting it this year. The lectures have been given to the level of understanding of the lay public, and increased attendance on each succeeding Sunday afternoon has shown the growing interest of the public in dental subjects.

PUBLIC HEALTH SERVICE ANNOUNCES APRIL EXAMINATIONS

Dentists interested in Public Health careers are invited by the Public Health Service of the Federal Security Agency to apply for Dental Officer examinations to be held April 17-19 in various cities throughout the country.

Permanent appointments as Dental Officers in the Regular Commissioned Corps will be made in the grades of Assistant and Senior Assistant Dental Surgeon, equivalent to Army ranks of 1st Lieutenant and Captain, respectively.

Entrance pay is $5,686 for Assistant and $6,546 for Senior Assistant (with dependents), including the $1,200 additional pay received by Dental Officers and rental and subsistence allowance. Applicants must be citizens and graduates of an approved school of dentistry.

Application forms, which must be completed and returned to the Washington office by March 20, may be secured from the Surgeon General, U. S. Public Health Service, Federal Security Agency, Washington 25, D. C. Attention: Division of Commissioned Officers.

ARMED FORCES

202 APPLICANTS APPOINTED IN DENTAL STUDENT PROGRAM

A total of 202 selected dental students have been appointed second lieutenants in the Medical Service Corps Reserve and placed on active duty in 36 dental schools under the Army Senior Dental Student Program, according to an announcement by Major General Thomas L. Smith, Chief, Dental Division, Office of the Army Surgeon General.

This year the Army Medical Department was authorized to tender commissions as second lieutenants in the Medical Service Corps Reserve to 300 selected dental students who are matriculated in dental schools approved by the Department of the Army. Under the program, these students are permitted to continue their studies in their respective schools

as officers on active duty with full pay and allowances until they complete the academic requirements for the degree of Doctor of Dental Surgery or Doctor of Dental Medicine.

Upon completion of their dental education these officers will be appointed as first lieutenants in the Dental Corps Reserve, and serve on active duty at an Army installation for two years.

STUDENT STATUS REMAINS AS IN 1948 SELECTIVE SERVICE ACT

A bill requesting the extension of the Selective Service Act (H. R. 6826) for three years, beginning this June when the 1948 act expires, is now before the Committee on Armed Services for consideration and study of proposed legislation.

The Selective Service Act of 1948 has not been used to draft manpower, but the fact that it could be used if needed has been a stimulus for voluntary enlistments. The act calls for the induction of persons between the ages of 19 and 26; however, dental and medical students in this age bracket are, under certain circumstances, given the right to finish any academic year of work.

Hearings began on the new bill January 20, but at press time no legislation had been enacted.

MAJOR HASKINS FIRST IN ARMY "RESIDENCY TRAINING"

Maj. Harold P. Haskins, former chief of dental services at five army hospitals, will be the first officer to train under the newly inaugurated Army Dental Corps "Residency Training" program at the Army Medical Center in Washington, D. C.

Under the program, dental officers will receive advanced instruction at the Medical Department Research and Graduate School and extended on-the-job training and practical guidance in self-elected specialties at army hospitals.

Major Haskins, specializing in prosthodontia, will receive his residency training at Walter Reed General Hosptal.

ISOLATED COAST GUARD UNITS TO GET YEAR-ROUND DENTAL CARE

Members of Coast Guard units stationed in isolated areas soon will receive regular dental care, regardless of foul weather and difficult winter travel, thanks to three new mobile dental units assigned to this service.

The dental units are of the automotive type rather than the seagoing variety, and are constructed to withstand all weather conditions which will allow for bringing services to personnel on a year-round schedule. This will be especially important in areas where winter travel has been prohibitive in the past.

RESEARCH

DANISH ODONTOLOGIST IN AMERICA FOR RESEARCH

P. O. Pedersen, professor of oral diagnosis and associate dean of the National Dental College of Denmark, is on leave of absence in the United States to carry out dental research. Dr. Pedersen is a Public Health Service Research Fellow at the National Institute of Dental Research, Bethesda, Md.

An authority in dental aspects of anthropology and forensic medicine, he earned his doctor of odontology degree in Copenhagen for his extensive studies of Eskimo dental anatomy and pathology. Dr. Pedersen is president of the Danish Odontological Society and Scandinavian correspondent to THE JOURNAL.

NUTRITION FOUNDATION GRANT TO PITTSBURGH PROFESSOR

Dr. R. H. Fitzgerald, chancellor of the University of Pittsburgh, has announced a $3,000 grant from the Nutrition Foundation to the University for research to be done by Gerald J. Cox, professor of dental research, on "Factors in the Diet That Control Tooth Development." The grant is for one year and began on January 1.

Under the grant a study will be made of the use of nutrition in forming teeth without pits and fissures, thus hoping to eliminate such defects to avoid decay.

Dr. Charles Glen King, scientific director of the Nutrition Foundation and former professor of chemistry at the University, will work with Dr. Cox regarding reports and other details of the project.

INTERNATIONAL

AMERICAN DENTISTS INCREASE F.D.I. MEMBERSHIP BY 175

A total of 700 American dentists have joined the Federation Dentaire Internationale, according to Oren A. Oliver of Nashville, Tenn., treasurer of the federation enrollment in this country.

Included in the total are 525 renewals and 175 new memberships. F.D.I. memberships may still be obtained by forwarding a check for $5.00 to Dr. Oliver at 1915 Broadway, Nashville.

FRENCH F.D.I. MEMBERS INVITE AMERICAN COLLEAGUES

The Federation Dentaire Internationale, created in Paris in 1900, will celebrate its 50th anniversary in the city of its founding from July 23 to 30 and has extended a cordial invitation to American dentists to attend.

Dr. Henri Villain has requested that all interested members who plan the trip, make tentative arrangements as early as possible and register with a travel agent for steamship space. He emphasized that this is necessary owing to the great demand for all classes of space during the height of the tourist season next summer.

Dr. Villain may be contacted for further information at Federation Dentaire Internationale, 45, rue de la Tour d'Auvergne, Paris 90.

GENERAL NEWS

HERBERT C. MILLER FUND ESTABLISHED AT OREGON

At the June, 1949, business meeting of the Alumni Association of the University of Oregon Dental School, a resolution to establish a Herbert C. Miller Memorial Fund was unanimously approved.

The fund was established to honor the memory of Herbert C. Miller who, for nearly 50 years, made vast contributions to dental education in the Pacific northwest and western Canada. Dr. Miller served first as dean and later as president of the North Pacific Dental College of Oregon.

The resolution provides that the fund be established with money received from life membership fees, gifts, appropriations, donations, bequests and from other receipts designated for that purpose. In addition, ten per cent of the total amount received from registration fees at each annual meeting is to be paid into the fund.

The fund, to be used for the benefit of dental education under auspices of the University of Oregon Dental School, will be directed by an executive committee of three members to be appointed by the president of the Alumni Association and the dean or Executive Committee of the Dental School.

ORAL PATHOLOGY EXAMINATIONS AT ATLANTIC CITY SESSION

The 1950 meeting of the A.D.A. will afford the opportunity for appearance before the American Board of Oral Pathology, which will conduct an oral and practical examination.

Lt. Col. Joseph L. Bernier, DC, Secretary of the Board, has announced the examination, the exact time and place to be published at a later date. Individuals who contemplate appearing before the board are advised by Colonel Bernier to make arrangements to submit their credentials as soon as possible.

Prospective candidates may secure detailed information by addressing Colonel Bernier at Armed Forces Institute of Pathology, 7th Street and Independence Ave., S.W., Washington 25, D. C.

CONSIDERATION OF DENTISTRY IN CARDIOVASCULAR DISEASE

Among the decisions reached at the National Conference on Cardiovascular Diseases, held January 18, 19 and 20 in Washington, were two important points in which dentistry is particularly interested.

The Sub-committee on Congenital Heart Disease listed under the "Prevention" category the avoidance of German measles and, especially important to persons suffering from such heart conditions, the prophylactic use of penicillin or sulfadiazine prior to and following dental extraction, tonsillectomy or other operations, in an effort to prevent sub-acute endocarditis.

The Sub-committee on Rheumatic Fever and Rheumatic Heart Disease concluded that to prevent recurrences, preventive measures should be taken against sub-acute bacterial endocarditis. It was suggested that practical penicillin prophylaxis be given individuals suffering from rheumatic heart conditions at the time of operative procedures such as extensive dental work (especially extractions).

The cardiovascular conference, sponsored by the American Heart Association and National Heart Institute, was designed to investigate, define and develop immediate and long-range programs to meet the problems of heart and circulation diseases. The sponsors hope to coordinate the efforts of all professional and lay groups in an effort to combat these diseases in individual communities.

NURSES URGED TO JOIN SCHOOL HEALTH WORKSHOPS

The Joint Committee on the Nurse in the School Health Program has issued a statement favoring the inclusion of registered nurses in school health workshops, according to Elizabeth S. Avery, Health Education Consultant and chairman of the sub-committee.

The committee of health educators, members of the National Education Association, have expressed the opinion that nurses should be included in workshop groups on school health to participate in the planning. The committee urges that nurses be invited to participate and that more materials of interest to school nurses be included in health projects.

DENTAL CARE URGED FOR COLLEGE STUDENTS

With only 18 per cent of the nation's colleges maintaining routine dental examinations, surveys of college students reveal an astonishing number of dental defects, according to a report from the Third National Conference on Health in Colleges.

The Committee's report, titled "A Health Program for Colleges," derides a

situation that exists in what it terms "a population group which might be expected to have received better than average nutritional benefits and dental care." The report states that these institutions of higher learning "seem to be doing very little about this problem" and indicates that they should further study their responsibility in this matter.

This definitive reference work is available in book form from the National Tuberculosis Association, 1790 Broadway, New York 19, at $2.00 per copy.

TWO DENTAL INTERNSHIPS OPEN AT GALLINGER HOSPITAL

Gallinger Municipal Hospital, Washington, D. C., has announced two openings for dental internship for the year beginning July 1, as approved by the A.D.A. Committee on Hospital Dental Service.

Gallinger is a 1,700 bed general hospital with dental work confined to major and minor oral and dental surgery for the in-patients. Further information and application forms may be secured by writing to Arthur Merril, Chief, Dental Division, Gallinger Municipal Hospital in Washington.

HOMER C. BROWN, SUBJECT OF NEWSPAPER EDITORIAL

The *Ohio State Journal* for December 31, 1949, carried an editorial honoring Homer C. Brown as the "Dentist of the Year" with an especial pride in that Dr. Brown is a resident of Columbus.

The editorial said in part: "Knowing his record, we heartily agree with Dr. Clyde E. Minges, president (past) of the American Dental Association, when he calls Dr. Brown 'Dentistry's Grand Old Man.'"

Of important mention was the fact that Dr. Brown was instrumental in the first dental legislation enacted by Congress, in 1901, and "after which he was responsible for enactment of half a hundred laws aiding dentists, among them the placing of Dental Corps officers on an equal basis with Medical Corps officers."

Dr. Brown was president of the A.D.A. in 1913, and his wife was president of the Auxiliary in 1924 and 1925.

DENTAL HYGIENISTS REFUTE RESEARCH TRAINING PLANS

The American Dental Hygienists Association, while striving to raise educational standards, is not attempting to enter into the field of pedodontia, according to A. Rebekah Fisk, executive secretary of the ADHA.

Miss Fisk stated in a letter to THE JOURNAL that the hygienists' efforts to increase educational requirements "should not be interpreted as an attempt to expand our field of practice. There is no subversive activity in our organization to bring about any such change."

In a resolution passed on January 8, 1945, it was resolved that the ADHA "precludes any service other than those stated in the present laws governing the practice of Dental Hygiene in the various states in which the dental hygienist is licensed."

Miss Fisk states that the organization today adheres to the resolution.

HOUSE OF DELEGATES ACTION ON DENTAL NURSES PROGRAM QUESTIONED BY MASSACHUSETTS COMMISSIONER OF HEALTH

In July 1949 the legislative body of the Commonwealth of Massachusetts passed Senate Bill 714 which became Chapter 473 of the Massachusetts Acts of 1949. Termed "an emergency law, necessary for the immediate preservation of the public health and convenience," the legislation authorizes and directs the Department of Public Health to institute a special five year program of dental research for the training of feminine personnel who shall be enrolled as hygienists. These young women are to receive two years' training after which they will be permitted to prepare and fill cavities in children's teeth under the supervision of a dentist in a dispensary or clinic approved by the Commissioner of Health. The program is to be conducted under the supervision of the Department of Health and the Board of Dental Examiners and is financed by the Children's Bureau of the Federal Security Agency.

The passage of this legislation providing for the establishment of an experimental dental care program for children similar to the school dental nurses program of New Zealand, and permitting the development of two standards of dental education and dental service, immediately aroused concern and controversy among members of the Massachusetts Dental Society, repercussions of which reached the Council on Dental Health, Council on Dental Education, and the House of Delegates of the American Dental Association at its 90th annual session in San Francisco.

The Council on Dental Education last July concluded its deliberation on the training and employment of dental nurses by issuing the following statement:

> It has been brought to the attention of the Council on Dental Education that courses for the training of "dental nurses" have been suggested for, and have been encouraged in, this country. These courses have been proposed for the express purpose of training personnel to care for children's teeth. It has also been brought to the attention of the Council that training programs for "dental nurses" in territories and possessions are being encouraged by American dentists. The Council, after considering the matter, has expressed its concern over the implication that children's dental needs can be cared for by dental personnel less well trained than those qualified to care for the dental needs of adults. The Council feels that the care of children's teeth requires skill equal or superior to that given to adults and for that reason anyone who attempts to care for the dental needs of children must take the same training required of those expecting to be licensed as dentists.

The Council on Dental Health in its supplemental report to the House of Delegates last October stated:

> Attempts are now being made to introduce into this country and its territorial possessions, the New Zealand dental care plan for children. The main feature of this plan is the training and employment of dental nurses to perform dental services for children. The adoption of this plan would create a new category of dental personnel. There is complete lack of reliable information on the soundness and effectiveness of this program as it operates in New Zealand.

On the basis of current information the Council on Dental Health requested the Board of Trustees to "consider the possibility of providing support for a study of the dental care plan—based on the training and employment of dental nurses."

The House of Delegates of the Association last October, after studying the reports of the Council on Dental Health and the Council on Dental Education, passed the four resolutions which are cited in Secretary Hillenbrand's Decem-

ber 23, 1949, letter to Dr. Vlado Getting, Commissioner of Health of Massachusetts, a copy of which follows:

My dear Doctor Getting:

I wish to inform you that the House of Delegates of the American Dental Association, in annual convention in San Francisco, October 17-20, adopted the following resolutions in connection with the experimental program to train feminine personnel to perform certain dental operations:

Resolved, that the American Dental Association deplores the apparent failure of the Massachusetts State Legislature to approach the Massachusetts State Dental Society preparatory to inaugurating this program without the knowledge and the endorsement of the American Dental Association, and be it further

Resolved, that all such programs concerning the development of sub-level personnel, whether designed for experimental purposes or otherwise, should be planned and developed only with the knowledge, consent and cooperation of the respective state associations and the American Dental Association for the purpose of protecting public health and welfare and be it further

Resolved, that the Council on Dental Health continue its study of the matter.

The House of Delegates also approved the following resolution on recommendation of the Council on Dental Education of the American Dental Association:

Resolved, that the American Dental Association approve the formal statement of policy that a teaching program designed to equip and train personnel to treat children's teeth cannot be given in a less rigorous course or in a shorter time than that approved for the education of dentists.

Copies of this letter are being sent to the officials of the Massachusetts State Dental Society and to the interested agencies of the American Dental Association.

Faithfully yours,
Harold Hillenbrand, D.D.S.,
Secretary.

Following is a copy of Dr. Getting's reply to Dr. Hillenbrand dated January 25, 1950:

Dear Dr. Hillenbrand:

Attached please find our reply to your communication of December 23, 1949, in which you sent me the resolutions passed by the House of Delegates of the American Dental Association at the meeting in San Francisco, October 17-20.

The Department requests that this reply be published in the official *Journal of the American Dental Association*.

At no time has this Department or any of its agents received any inquiries from the American Dental Association relative to the facts of this program. We are ready to receive any visitors or any inquiries on your behalf in regard to this program at any time.

Text of Statement of Department of Public Health.—The resolutions which this Department was informed were passed by the House of Delegates are as follows:

"*Resolved*, that the American Dental Association deplores the apparent failure of the Massachusetts State Legislature to approach the Massachusetts State Dental Society preparatory to inaugurating this program without the knowledge and the endorsement of the American Dental Association, and be it further

"*Resolved*, that all such programs concerning the development of sub-level personnel, whether designed for experimental purposes or otherwise, should be planned and developed only with the knowledge, consent and cooperation of the respective state associations and the American Dental Association for the purpose of protecting public health and welfare and be it further

"*Resolved*, that the Council on Dental Health continue its study of the matter.

"*Resolved*, that the American Dental Association approve the formal statement of policy that a teaching program designed to equip and train personnel to treat children's teeth cannot be given in a less rigorous course or in a shorter time than that approved for the education of dentists."

The Massachusetts Department of Public Health, established in 1869, has had a long record of progress, research and development in the interest of human welfare. As far back as 1850 Lemuel Shattuck's report on the status of the health of the people of the Commonwealth deplored the amount of preventable illness and the number of untimely deaths of

our citizens. Over these many decades the Department, cooperating with the professions of the healing arts, through special research projects has developed many programs which, having proved their value here in the Commonwealth have served as patterns for other state programs.

Justifiably proud of its past record, the Department is endeavoring to continue its pioneering role in the field of preventive medicine under the constant stimulation of the Executive Department and the Legislature. The Department as an agent of government shall continue to carry on the many duties and responsibilities entrusted to it. The duties and responsibilities of the Department are not only executive and administrative but also quasi judicial and quasi legislative. As an official agency of State Government, the Department cannot seek consent from any private agency. The Department acts on behalf of all the people of the Commonwealth. It, nevertheless, has constantly sought the advice and guidance of the various professions and arts in its efforts to better the health of the people.

In only one instance did the General Court pass legislation contrary to the wishes of the medical profession. In 1926 a law directed the Department to "organize and establish cancer clinics and conduct such clinics with or without cooperation on the part of municipalities, local physicians, and other agencies." These clinics have since not only received the full endorsement of the medical profession but have served as a model for cancer programs throughout the country. It is a matter of record that relations between the professional groups and the Department of Public Health have never been as cordial as they are at this time. It has always been and always shall be the policy of the Department to work with and not against medical and dental practitioners. We have sought the endorsement of all interested professional groups in all our programs.

The passage of a law in Massachusetts, as in any state, or in the Federal Congress, is a matter of public information. It is impossible for a law to be passed without publicity in the newspapers and in legislative bulletins. It is the responsibility of interested groups to watch carefully the progress of legislation so that they may take advantage of opportunities to be heard. In this specific instance, An Act Providing for a Dental Research Program under the Supervision of the Department of Public Health and the Board of Dental Examiners for the Training of Feminine Personnel, Chapter 473 of the Acts of 1949, was drawn up for the Department after consultation with members of the Massachusetts Dental Society. The bill was reviewed by the two agencies of government concerned with dental health, namely the Massachusetts Board of Dental Examiners and the Department of Public Health. This law is not a change in the dental practice acts. It was heard before the Joint Senate and House Committee on Public Health at a public hearing at which appeared not only representatives of both of these governmental agencies, but also many prominent dentists who are members of the Massachusetts Dental Society and of the American Dental Association. Again the Department did more than was required of it to keep the dental profession informed of this legislation.

Although the Department already possessed the authority to initiate this research project, the legislation was passed at the suggestion of the dental member of the Public Health Council in order to protect the dental profession. As enacted, the law defined the terms of the program and limited it to a period of five years.

The deplorable dental health record of New England, and Massachusetts in particular, was revealed by the selective service data of World War II. As a result the armed forces were compelled to reduce their dental health standards for induction to a point of practical non-recognition of this aspect of physical fitness. The report entitled "Health Services for Massachusetts Children" prepared under the auspices of the American Academy of Pediatrics emphasizes the critical need for more adequate dental care.

Recent dental examinations in ten Massachusetts communities confirmed the known lack of adequate dental care. Nearly one hundred per cent of teen-age children show evidence of dental caries; yet less than sixty per cent have received dental care for a single permanent tooth. Moreover, there is irreparable loss of permanent teeth by multiple extractions in over fifty per cent of our teen-age children.

The facts concerning care of the deciduous teeth are even more appalling. Observations made by this Department can only lead to the conclusion that the practice of pedodontia is practically nonexistent.

For many years the Department has been seeking a solution of this problem and in 1946, at the request of the Massachusetts Dental Society, the Division of Dental Health was established. At the specific urging of the Massachusetts Dental Society a dentist was appointed by the Governor to the Public Health Council. With the advice and guidance of consultants from the dental schools and the Massachusetts Dental Society the Department initiated a program for the evaluation of the topical application of fluorides to the teeth of school children and other research projects. These included the use of fluoride salts applied topically by various methods, the application of fluorine to water supplies, and the promotion of school dental clinics through our local health departments. Because of the seriousness of our dental problem, the Department is constantly seeking methods for improving dental services. This research project was studied for a period of approximately two years before a definitive program was finally developed and presented to the Children's Bureau of the Federal Security Agency, which makes funds available for this program.

The American Dental Association and the Massachusetts Dental Society have long demonstrated their interest in progressive research. It is difficult at this time to understand the grounds on which it logically can object to research which evaluates new methods of meeting the problem of dental disease. The objective of this research program is to determine scientifically whether the training of feminine personnel to perform certain dental operations, namely, the filling of children's teeth under the supervision of registered dentists, can be carried out in a manner which will meet the approval of most unprejudiced persons who are qualified to pass upon the quality of work performed. The project will terminate at the end of five years. An evaluation will be made by the Department upon the advice of not only the dental profession and the Forsyth Dental Infirmary with its many consultants and advisors in the field of dentistry, but with the advice of the over-all Advisory Committee consisting of dentists, physicians, public health officials, medical social workers, civic leaders, and the public itself.

If, as stated by its spokesman, Harold Hillenbrand, D.D.S., Secretary of the American Dental Association, its policy is one of activity in the fields of research, education and care, the Department humbly suggests that the resolutions adopted by the House of Delegates of the American Dental Association, meeting in annual convention in San Francisco, October 17-20, 1949, may perhaps have been hurried and therefore inconsistent with the declared objectives of the American Dental Association. The Department is convinced that no actual controversy exists between the American Dental Association, the Massachusetts Dental Society, the dental profession at large, and the Department of Public Health. We have the same objective, namely the improvement of dental health; and working together, the dental profession and the Health Department can attain this objective through the fields of research, education and better care for the teeth of children.

Sincerely yours,
Vlado A. Getting, M.D.

The Board of Trustees of the Association in January approved the recommendation of the Ad Interim Committee of the Board that Dr. Allen O. Gruebbel be delegated to visit New Zealand and investigate and report on the school dental nurse program of that country. Dr. Gruebbel departed on his assignment February 14 and will present a report of his findings to the Board of Trustees immediately upon his return about the first of May, following which his report will be published in THE JOURNAL.

BOOK REVIEWS

America's Health. A Report to the Nation by the National Health Assembly. 395 pages. Index. Price $4.50. New York: Harper & Brothers, 1949.

America's Health is the official report of the findings and recommendations of the National Health Assembly, convened at the behest of the President during May 1948. Its pages offer solemn testimony to our national deficiencies in health resources. But since these shortcomings are generally matters of public knowledge, the particular merit of this book lies in its integration of these facts into a basis for determining public health policy for the next decade.

On the problem of health manpower the text is frank and direct. The first consideration in achieving the health goals of the nation is sufficient personnel to staff hospitals and clinics, health departments, research laboratories, and the various categorical programs of disease control. The manpower shortages in the professions of medicine, dentistry, and nursing are strikingly parallel and together they suggest the need for (1) increasing the funds available to the training institutions, (2) aiding qualified candidates who cannot meet the costs of a professional education and (3) assuring larger numbers of qualified persons an opportunity for a career in the health professions. Only when the personnel bottleneck has been effectively resolved, can we proceed to a systematic solution of our other health problems.

The remaining chapters constitute a bill of particulars which can be briefly summarized. Hospital facilities must be expanded and local public health units must be strengthened and established to cover the forty millions of our population now without the benefit of organized health services. Chronic disease, which has been described by one author as the "unseen plague," must be attacked vigorously as the population continues to age. Other important areas for action include maternal and child health services, rural hygiene, rehabilitation, nutrition, and medical research.

The subject of payment for medical care is the sole issue upon which the Assembly failed to reach complete agreement. But even here, it was commonly felt that the "principle of contributory health insurance should be the basic method of financing medical care for the large majority of the American people."

The book supports the thesis that no complete program for better health can be accomplished by congressional legislation. It can result only from painstaking planning and implementation on a regional, state, and community level.—*Samuel Herman.*

Danger! Curves Ahead! By Miriam Lincoln, M.D. 138 pages with 16 illustrations, 7 photographs. Price $2.50. New York: The Macmillan Company, 1949.

Facing the realities squarely, nevertheless Dr. Lincoln serves up her recommendations in such tasty form that the taking of them assumes almost pleasurable aspects. In addition to knocking on the head various misconceptions about how obesity is acquired and how it may be disposed of, she demonstrates with a wealth of practical examples how reducing can be accomplished on a diet that is good, varied and tasty.

Complete frankness rules discussion of the various problems, and the reader is never left with any lingering hope about what might be expected from some magic pill or any confusion about why exercising violently or taking steam baths and special massage may not accomplish the desired results. Especially commendable is the manner of orientation for the prospective dieter, with special chapters on what to expect when dieting and on training the appetite. The inexorable facts are put plainly in a chapter dealing with the arithmetic of gaining or losing and how to estimate metabolic needs, and in another showing the piles of food a piece of pie or a chocolate malted milk equals.

Most of the last seven chapters of the book constitute a gold mine of exact information on diet menus and caloric contents, with suggested recipes as well as complete menus for a winter week and a summer week. On the last two pages the reader who has cooperated properly is cheered by the list of serious maladies to which he might otherwise have succumbed.—*William W. Bolton.*

THE READER COMMENTS

THE JOURNAL devotes this section to comment by readers on topics of current interest to dentistry. The editors reserve the right to edit all communications to fit available space and require that all letters be signed. Signatures will be deleted before publication at the request of the author. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your individual participation in this section is invited.—The Editor.

APPLAUSE FOR DR. THOMAS

Please accept my thanks for the very wonderful paper by Dr. B. O. A. Thomas in November's JOURNAL. "Operative Procedures and Periodontal Health" is, to my way of thinking, one of the most significant and generally applicable articles I have ever read in this or any other dental publication.

I would very much like to obtain reprints of this article for my office. Would you be so kind as to let me know how I can best do this?

This is the very first letter I have ever written as a resut of reading any magazine, but I felt that both THE JOURNAL and Dr. Thomas are to be warmly thanked for such a timely dissertation. —*Elliot J. Carter, Huntington, N. Y.*

THE LANE ARTICLE

I was pleased to read the recent article by Mr. Lane entitled, "A Survey of Dental Alloys." It is a fine summary of the very important role of Metallurgy in dentistry. I am sure that Metallurgy in its broad aspects has much to offer to dentistry and will make more broad the contribution of the dentists to comfortable pleasant living.

There are several items in Mr. Lane's article which require clarification or correction to aid the reader in evaluating the information.

(1) The importance of grain size cannot be underestimated, particularly in clasps. It is not only in dental alloys that a fine grain is desired, it is a common structural characteristic desired of all metals and alloys for use at low temperatures. A fine grain size is specifically specified in selling steel, aluminum, copper and all their alloys. Fine-grain materials are harder and stronger than the coarse-grain materials at low temperatures, and this is particularly important in small cross sections. The very large increase of yield and tensile strength with the finer grain sizes is shown very clearly in the well-known book "Metals" by Carpenter and Robertson, V 1, pages 122-125, Oxford University Press, London, New York, Toronto, 1939.

The figure of 4 to 6 grains per cross section quoted by Mr. Lane is misquoted from an article written by me in the "Transactions of the American Society for Metals," Vol. 39, page 318, 1947. In this article, based on the needs of jet engine and gas turbine builders for strong materials at high temperatures, a coarse grain is desired, but even here where a coarse grain is stronger (but weaker at low temperatures) a minimum of 12 to 16 grains per cross section is suggested in order to obtain even a fair degree of reproducibility from casting to casting, while taking advantage of the coarse grain for high temperature use. The tests in this work, too, showed that as the

grain size became finer and finer, the reproducibility of mechanical properties improved appreciably. Whereas at room temperature, not only is the reproducibility improved, but barring unforeseen chemical changes, the strength is improved too. Accordingly, for low temperature use, it would be preferable to specify 20-50 grains per clasp cross sections, whereas 4-6 or even 10-12 is too coarse.

(2) It is further suggested that many of the alloys used by Mr. Lane were in the aged condition to enhance the properties at 1500 degrees F. The properties of these treated alloys are therefore not comparable to the as-cast properties of the dental alloys.

(3) Alloy 6059 while basically similar to Ticonium is not a comparable alloy any more than pure copper is comparable to beryllium copper (through the addition of several percent of beryllium). This 1 to 2 percent addition of beryllium not only lowers the melting points of this dental alloy but increases the yield strength by at least 20,000 psi and the tensile by at least 30,000 psi over alloy 6059. There is, of course, a corresponding decrease in ductility and an increase in hardness. Alloy 6059 as-cast shows about 60,000 psi yield strength, 85,000 psi tensile strength, 10-15 Rockwell C hardness. Ticonium alloy shows maximum properties of 100,000 psi yield strength, 125,000 psi tensile strength, and about 30 Rockwell C hardness in the as-cast condition.

(4) The substitution of nickel for cobalt may, incidentally, make a less expensive alloy. However, the nickel addition serves several very important purposes.

(a) It stabilizes the cubic phase in the as-cast condition (versus the less desirable hexagonal phase).

(b) It lowers the melting point of the alloy.

(c) It provides an important hardening system when beryllium is added. The nickel-beryllium system for increasing hardness either through aging or through formation of a secondary phase is well-known, and is frequently used in Metallurgy. The behavior is similar to the hardening of copper by beryllium in beryllium-copper alloys.—*Nicholas Grant, Mass. Institute of Technology.*

CURRENT LITERATURE

An Investigation Into the Apparatus and Technical Factors Involved in the pH Measurement of Semi-Micro Dental Areas. A. J. Clement. The Official Journal of the Dental Association of South Africa, 4:317, August 15, 1949.

This study deals with the experimental evaluation of available methods of pH determination in order to decide which method is best suitable for further development as a research tool. The colorimetric method, using well known indicators, was not recommended because of the inability, for various reasons, to obtain values within closer limits of accuracy than 0.2 pH units. Similarly a consideration of standard electrometric methods of pH measurement including the antimony, the quinhydrone, and glass electrode methods was made. It was found that the antimony and quinhydrone methods were not completely and adequately suitable for semi-micro adaptation to pH measurements in dentistry and dental research. However, the glass electrode offered the greatest possibility of use in *in vivo* pH measurements of dental plaques and further studies using the procedure will be made.—*J. C. Calandra.*

Present Status of Knowledge Concerning the Etiology of Periodontal Disease. Charles H. M. Williams. Oral Surg., Oral Med., Oral Path. 2:729, June 1949.

Periodontal disease has been described in the past as being caused by the irritating effects of food and cell debris, calculus and bacteria, resulting in inflammatory reactions of the gingivae, slow progression of pocket depth, and slow progression of abnormal mobility of the teeth. The question arises whether we should regard this periodontitis simplex as a disease of strictly local origin.

Various theories of calculus formation are reviewed and the author emphasizes the thought that its formation is preceded by abnormal gingival conditions. It is recognized that, once formed, calculus causes irritation. Deficiencies of niacin, pyridoxine, and vitamin A have been shown to produce inflamed gingivae and calculus in laboratory animals. Studies on ferrets and observations on primitive humans have demonstrated that vigorous occlusal function aids greatly in keeping the gingivae healthy.

Periodontitis complex is said by some to be caused by general metabolic disturbances which result in a noninflammatory degeneration of periodontal tissues. Most investigators feel that periodontal disease is caused by both local and constitutional factors and the problem is to decide the significance of each factor in each type of periodontal disease.

Three main groups of systemic disturbances have been mentioned most frequently: (1) nutritional inadequacy because of suboptimum diet or the use of drugs which prevent normal assimilation of essential nutrients, (2) nutritional disturbances resulting from abnormal endocrine function, and (3) other illnesses, especially those causing marked debility, *e.g.*, blood dyscrasias, metabolic poisonings, and so forth.

Calculus and abnormal functional stimulus are local factors affecting gingival health. It has been shown that the alveolar bone and gingivae grow with the erupting teeth, even as the latter are worn down by function; and it is felt that the principle of continued eruption with the exposure of the cementum of the roots is a misconception. Traumatogenic occlusion can predispose to either periodontitis simplex or complex depending on the type of damage to the supporting structures. The rough edges and surfaces of dental restorations are not of major importance generally. Bacteria are now considered to be secondary invaders and not primary causes of periodontal disease.

The establishment of periodontal disease is compared to a soil and seed relationship between the systemic and local factors. If the soil (systemic condition) is good, the weed seed (bacteria) will get a foothold in proportion to the condition of the grassy sod (epithelial covering of the gingivae).

It is concluded that no single local or systemic factor mentioned is the likely cause of establishment of typical periodontal disease.—*William A. Peterson, D.D.S.*

Journal of Oral Surgery
April 1949

Titles marked with an asterisk are reviewed below by Paul C. Salisbury, Russell G. Boothe and Warren Schram, faculty members of the Dental School, Northwestern University.

*Surgical Management of Cancer of the Mouth. James B. Smith, Danville, Pa.—95.
*Some Principles of Bone Pathology. Harry Sicher, Chicago.—104.
*Preoperative Treatment and Study of Concepts. Frederick W. Coggan, Kalamazoo, Mich.—117.
*Postoperative Care Following Carcinoma Surgery. L. W. Peterson, St. Louis.—121.
*Hemorrhagic Conditions of Importance in Oral Surgery. O. Lee Ricker, Grand Rapids, Mich.—129.
*Diagnosis and Surgical Removal of the Mandibular Impacted Third Molar. H. W. Sorensen, San Francisco.—145.
*The Nerve Supply to the Maxillary Incisors. William A. Cook, Detroit.—149.

Surgical Management of Cancer of the Mouth. James B. Smith.—95.

An evaluation of methods of treatment of oral cancer and the indications are presented with several case reports. Early recognition and promptness in instituting treatment are stressed.

Some Principles of Bone Pathology. Harry Sicher.—104.

In the opening paragraph the author states, "This paper is an effort to clarify some aspects of the biology of normal bone that are of special significance to an understanding of problems of bone pathology and to indicate how some problems of bone pathology can be clarified by the application of the principles of bone biology."

The material which he presents is so thoroughly condensed that only a few of the fundamental concepts which are discussed may be included in this brief review. The author states that the evidence for cellular formation and resorption of bone is overwhelming. He believes that since the decalcification of bone tissue is not possible a decrease of density in bones means, primarily, a decrease in the volume of calcified bone tissue. The article suggests that in all instances bone healing is fundamentally the same and that any deviations from the usual pattern, as for instance in the repair of the upper or lower jaws, is attendant upon circumstances which are peculiar to each situation. This is an excellent review of the subject of bone and bones, and deserves the thorough study of anyone interested in dentistry.

Preoperative Treatment and Study of Concepts. Frederick W. Coggan.—117.

This paper points out the necessity of differentiating between syphilis, tuberculosis, and carcinoma in patients where metastases have not developed.

Methods of carrying out physical examination and laboratory tests to determine correct diagnosis as well as patient's ability to tolerate surgery are presented.

Postoperative Care Following Carcinoma Surgery. L. W. Peterson.—121.

The importance of proper care following extensive surgery is stressed. Most complications are said to be avoided by attention to detail and proper nursing care. Discussion deals with maintenance of airways, hemorrhage, shock, diet, sedatives and dressings. The extensive nature of the surgery combined with the fact that many of these patients are advanced in years with associated debilitating diseases warrants the most exacting care. The author believes that consultation and treatment by a competent internist is often necessary.

Hemorrhagic Conditions of Importance in Oral Surgery. O. Lee Ricker.—129.

The entire picture of hemostasis is not well understood as yet. There are, however, certain well defined facts and hypotheses which will be helpful in selecting patients for operation. In recent years the importance of the clotting mechanism has received little consideration, and the function and efficiency of the endothelial system have been shown to be of great importance. While vessel contractability and retractability are among the most important factors in hemostasis, it is not likely that the body relegates all of this responsibility to one critically balanced process. The organism is economical and efficient, and the vital functions are often protected by multiple mechanisms.

The article describes various tests used to determine the patient's clotting and bleeding

time, and the various abnormalities are discussed. Local treatment of postoperative hemorrhage, particularly with the absorbable sponge materials and thrombin, is included in the article. Systemic treatment prior to surgery receives little attention. The implication very properly seems to be that such patients should be placed in the hands of physicians.

Diagnosis and Surgical Removal of the Mandibular Impacted Third Molar. H. W. Sorensen. —145.

The author gives his indications for the removal of the mandibular third molar as follows:

(1) When it is not possible to make room for the other twenty-eight teeth on the arch; (2) when all molars are abnormally large; (3) when the mandibular third molar is large and the maxillary third molar is small or absent; (4) when the permanent molars tilt forward owing to early loss of the deciduous molars, and these teeth must be tilted back into position; (5) for adult patients almost every third molar as soon as it is discovered.

In diagnosis one must have adequate roentgenographs and be able to read them properly. In the operative procedure asepsis is the most important single consideration, and next the proper planning.

The author prefers to operate either in the office with block anesthesia or in the hospital with general anesthesia. After making the usual mucoperiosteum retraction to allow good vision for the operator, a narrow 3 mm. chisel with a long bevel, and sharp, is used to remove necessary bone. Using a chisel is worthless without proper malleting. The amount of bone removed is the least that will facilitate the sectioning of the tooth.

The author has tried most of the different technics used in the removal of impacted third molars in the last 30 years and has had the best success with the mallet and chisel.

The Nerve Supply to the Maxillary Incisors. William A. Cook.—149.

The author states that the anatomy with which the oral surgeon deals has not been completely explored and that writers have accepted the descriptions of early anatomists.

There are variations in the nerve supply to the maxillary teeth, and it was taught that they were solely innervated by the anterior superior alveolar nerve.

The author explains the anatomy in cases of bilateral cleft lip and palate, that it would be impossible for the anterior superior alveolar to reach these teeth, and that it is a known fact that these teeth have a normal pulp sensation. The suggestion of the author that these pulps are innervated by the nasopalatine nerve is substantiated by seven reasons:

1. That these teeth have not been consistently anesthetized by injecting the anterior superior alveolar nerve alone.

2. On failure of anesthesia of these teeth by the anterior superior alveolar and on injection high in the incisive canal these teeth are anesthetized.

3. That the upper incisors are partly desensitized when the rhinologist anesthetized the nasal septum with cocaine packs.

4. The nasopalatine nerve develops on the lateral surface of the frontonasal process and that demonstrates that the nerve and the upper incisors develop together.

5. The anterior superior alveolar and nasopalatine nerves are branches of the maxillary division of the fifth cranial nerve, and have identical fiber origin and construction.

6. The nasopalatine nerve before entering the incisive canal gives anastomosing branches to the anterior superior alveolar nerve.

7. A dissection demonstrated a course by which the maxillary incisors could be innervated by the nasopalatine nerve.

The author has presented his work to anatomists, neuroanatomists and embryologists who agreed to the theory of the nasopalatine nerve sending fibers to the maxillary incisors as reasonable and probable.

Journal of Oral Surgery
July 1949

All titles below are reviewed by Herbert J. Bloom, Detroit.

Cephalometric Roentgenology: History, Technics and Uses. Allan G. Brodie, Chicago.—185.

External Malar-mandibular Fixation in Fractures of the Maxilla and the Mandible. P. Philip Gross, Philadelphia.—199.

Prosthetic Replacement for Tissues Lost Through Cancerous Lesions. Ralph S. Lloyd, Baltimore. —203.

Neoplastic Lesions of Interest to the Dental Profession. Francis P. McCarthy, Boston.—208.

Diagnosis of Oral Tumors. Reed O. Dingman and James R. Hayward, Ann Arbor.—217.
Anesthesia in Oral Surgery. Ralph G. Peterson, Minneapolis.—231.
Management of Hemophilia in Dental Extractions. Philip H. White and Stephen P. Mallett, Boston.—237.
Subcutaneous Emphysema. C. Jay Brown, Jr., Kansas City, Kas.—247.

Cephalometric Roentgenology: History, Technics and Uses. Allan G. Brodie.

Controlled cephalometric roentgenology is indicated in any situation where it is desirable to study the same patient over a period of time. A number of skulls can be compared by utilizing certain basic points or planes from which measurements can be made.

The technic of the Broadbent-Bolton roentgenographic cephalometer along with the correction of measurements and technics of superpositioning is described in detail. While these methods and technics of roentgenographic cephalometry are applicable to research problems, they can also be used for clinical purposes when determining exactly the results of clinical procedures.

The orthodontist has employed roentgenographic cephalometry to study the effects of his therapy. The chief value of these technics to prosthetic dentistry lies in the possibility they afford for the determination of the resting position of the various parts of the denture.

Growth studies have shown that facial abnormalities, such as cleft lip and palate, grow at normal rates if left alone. Repeated operations to close a palate inhibit growth of the maxilla and give rise to a condition that becomes progressively more disproportionate up to the time when growth ceases. The mandibular condyle has been shown to be the most active postnatal growth center in the entire head and one which operates over the longest period of time.

Movements of the mandible are not proof that the joint is not involved in a process of arrested growth. Only successive controlled roentgenograms will reveal arrested growth. Arrested condyle growth is revealed by warpage of the mandible.

External Malar-mandibular Fixation in Fractures of the Maxilla and the Mandible. P. Philip Gross.

A case is presented of multiple fractures of the maxilla and mandible without involvement of the malar bones. Extraoral skeletal fixation was employed using the "Frac-Sure" units to align and reduce the mandibular fragments. In addition, two screwpins were placed at divergent angles in each malar bone above the maxillomalar articulation. Upright rods were placed between the malar and mandibular units. After positioning the fragments of the maxilla and mandible, the clamps were tightened on the rods. The skin area at the base of each screwpin was cleansed and sealed with a dressing of collodion and cotton.

Prosthetic Replacement for Tissues Lost Through Cancerous Lesions. Ralph S. Lloyd.

There are many ways in which the maxillofacial prosthetist can be of assistance in a tumor clinic. After resection of a portion of the mandible, appliances can be constructed which will guide the mandible into occlusion and prevent displacement of fragments and impaired function.

Obturators can be constructed which will restore nearly normal function after treatment of tumors of the maxilla. Life-like prosthesis can restore the patient to a more normal appearance after the loss of nose, ears or a portion of the cheek.

Protective appliances are also constructed to aid in localizing radiation to desired tissues or to hold radioactive material in application to tissue.

Prosthetic appliances (1) permit examination of the tissue for recurrence; (2) restore where plastic surgery is inadvisable; (3) are relatively inexpensive.

Neoplastic Lesions of Interest to the Dental Profession. Francis P. McCarthy.

The dentist is usually consulted first and is held responsible for faulty or delayed diagnosis of malignant lesions of the oral cavity. Although oral cancer is essentially a disease of the male, there is a rising incidence of oral and laryngeal carcinoma of the female. The increased use of tobacco may influence this increase.

Vitamin A deficiency plays a role in the development of oral and esophageal hyperkeratosis. The combination of this deficiency along with sex hormonal unbalance may be an important basic factor in leukoplakia changes.

The control of the hyperkeratotic lesion is

of paramount importance in a discussion of oral carcinoma from the etiologic and preventive standpoint.

The treatment of leukoplakia is confined to the removal of the irritating factor in the mouth and abstinence from the use of tobacco. The use of electrodesiccation and electrocoagulation by monopolar and bipolar high frequency current has a place in the treatment of the disease.

Diagnosis of Oral Tumors. Reed O. Dingman and James R. Hayward.

To arrive at an early and sound diagnosis of neoplastic diseases, the physician must employ all possible clinical and laboratory aid available. After the help of the history, clinical and roentgenographic examinations, the biopsy is the only definite means of establishing the exact nature of the neoplasm. A negative biopsy for cancer should not lull the surgeon into illusions of security when a lesion has a clinical course with malignant characteristics.

When malignant growths involving bone are to be treated by roentgen therapy or radium, all teeth in the bony region must be removed before irradiation. Irradiation will devitalize or reduce bone vitality to a point where dental structures become dangerous avenues of infection. Postirradiation osteomyelitis of the jaws is one of the most difficult problems encountered in the management of patients with cancer.

Anesthesia in Oral Surgery. Ralph G. Peterson.

There is no universal anesthetic agent or combination of anesthetic agents best suited for all oral surgical procedures. The anesthetic agent and the method of administration are partially determined by the immediate general physical condition of the patient and the operation to be performed.

Local anesthesia is the least hazardous of all anesthetics. A 2 per cent procaine hydrochloride solution with epinephrine is the most popular. There appears to be no advantage in the use of 4 per cent procaine hydrochloride, 1 per cent Monocaine hydrochloride and Metycaine. Combining local and general anesthesia may be advisable in certain cases.

Where general anesthesia is used for oral surgery, a minimum of two technical assistants (three if thiopental sodium is employed) should assist at each operation. To all patients to be given thiopental sodium, 1/400 grain scopolamine hydrobromide or 1/300 grain atropine is given with the venipuncture immediately preceding the thiopental sodium. Unless an emergency exists postanesthetic stimulants are not administered.

The routine adult exodontia patient is positioned sitting in a surgical chair. In this position, the airway is more open, obstruction less common and respiratory activity and capacity greater than when lying down.

Management of Hemophilia in Dental Extractions. Philip H. White and Stephen P. Mallett.

As part of the blood substitutes program conducted during the war, human plasma was subjected to fractionation. Various fractions of plasma were tested for their ability to shorten the clotting time of hemophiliacs. Of these, fraction I seemed to be the most potent. It is available in vials containing 200 mg. For intravenous administration, the contents of the vial are mixed with 10 cc. saline solution. The average dose is 400 mg. in 20 cc. of physiologic saline. A few minutes after injection of the fraction, the blood coagulation time should be lowered and a significant reduction should continue for some five to eight hours. For topical application, fraction I acts as a hemostatic agent.

Subcutaneous Emphysema of the Face. C. Jay Brown, Jr.

Subcutaneous emphysema is the presence in the meshes of the subcutaneous tissue of air or other gases in quantities sufficient to cause a diffuse swelling which gives a crackling sensation under pressure. A traumatic or surgical opening is made in tissue directly adjacent to the respiratory system. Air is forced into the subcutaneous spaces by some violent respiratory exhalation and immediate swelling is produced. The swelling reaches its peak in five hours, after which it begins to subside.

In a case of subcutaneous emphysema of the face, some of the air was "milked" from the face back into the mouth through the oral incision. A sterile selvaged petrolatum gauze dressing was packed rather tightly into the wound and the tissue approximated with silk. The dressing was removed on the fourth postoperative day.

Subcutaneous emphysema offers an opportunity for bacterial invasion; therefore these patients should be watched carefully.

Children's Operative Dentistry Made Easier. By Paul F. Brumm, D.D.S., Cincinnati, Ohio.

Patient control, through a simple cut-off push button switch operated by the child (Figs. 1, 2, 3), has appealed to the youngsters in my practice for the last seven years. It is equally effective for nervous adults who prefer not to take Novocaine or nitrous oxide for operative work.

The switch is placed in series with the power line to the drill, breaking the drill circuit only. To install it, a hole was drilled and tapped with ⅛ pipe tap in the under side of the arm which extends from the unit to support the cuspidor. The hole was placed in this position to prevent water from getting into the unit. A bakelite bushing, obtainable from any electrical supply house, was screwed into the tapped hole. A short length of rubber-covered wire was extended from the switch through the bushing to the panel of the unit. The connections are simple, but should be made by a competent electrician.

It takes a little extra effort to demonstrate the use of the switch for the first time but, since the system puts the patient at ease through a sense of security, the effort is well spent. All but a very few will refrain from using the control until there is acute pain. As a reward for good behavior, the best children

Figure 2.

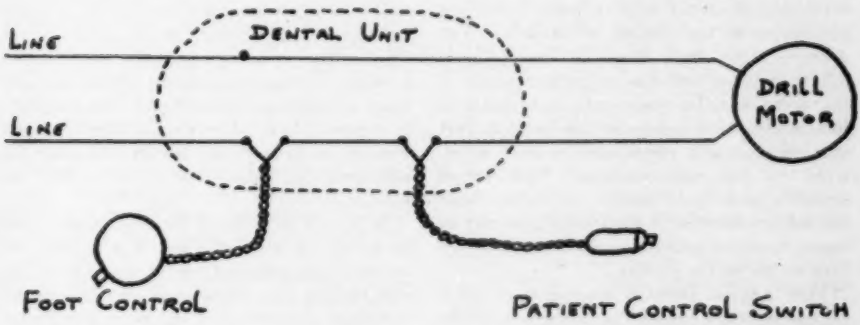


Figure 1.

Figure 3.

are given two plaster figures made from molds supplied by the A.D.A. For mediocre performance, only one figure is given, with a promise of two if the conduct improves on the next visit. For the older children, empty Novocaine carpules, to be used as whistles, make desirable rewards. The youngsters take a great deal of pride in not using the button. If only one statue is given, the child will be sure to improve the next time.—*5 Linden Drive, Wyoming.*

A Technic for Obtaining a Good Impression for an Immediate Full Denture. By J. Sommer, D.D.S., New York.

A great deal has been written about the advantages to the patient of immediate full dentures: the fact that the maxillo-mandibular relation and the height and width of the teeth can be preserved, and that the natural dentition can be so closely duplicated that the patient's appearance is scarcely altered by the new dentures. This report describes a technic which has been found helpful in obtaining a good impression for an upper denture, with consequent comfort and satisfaction to the patient.

First a good alginate impression is taken of the patient's mouth, including all of the mucobuccal and mucolabial folds and the juncture line of the hard and soft palate.

From this impression a stone model is prepared, and the teeth on the model covered with a 2 or 3 mm. thickness of plaster built up to form a continuous ridge whose side surfaces are slightly inclined incisally or occlusally.

A wax pattern is made on this model, with the wax about 2 mm. short at the labial and buccal periphery and extending slightly further posteriorly than is desired for the completed denture. It is then vulcanized, and prepared for muscle trimming and for post-damming. The tray is muscle trimmed with modeling compound and, if the procedure has been properly performed, the vulcanite tray will fit accurately and comfortably.

With a no. 560 bur, holes are bored in the vulcanite tray. One of the advantages of the vulcanite base over shellac is the ease with which the former may be drilled.

A somewhat soft mix of alginate impression material is now spread thinly over the muco-surface of the vulcanite tray and immediately carried to the patient's mouth. No pressure is necessary. The instructions of the manufacturer of the alginate material must be followed exactly regarding mixing and length of time it should remain in the mouth. The impression is removed and the stone model poured. The proper jaw relationship is identified easily because the model contains an exact duplicate of the patient's remaining teeth.

With this method, the patient at no time experiences any sensation of hard pulling on teeth or other tissues. The procedure is less trying to the patient because the materials which are put into his mouth are for the most part soft. Because of the holes in the tray, paste escaping through them leaves a thin, homogenous layer which provides more intimate contact with the mucosa which it covers. Thus, when copied into the new denture, this intimate contact provides for adherence by compression rather than by suction.

It is both of help to the oral surgeon and of benefit to the end result if a replica and stone of the trimmed model are sent to the oral surgeon as a guide when he performs the necessary alveolectomy.—*74 West 50th Street.*

DEATHS

Ackerson, Lewis E., Clymer, Pa.; died November 26; aged 82.

Amsden, Charles E., Norwalk, Ohio; died December 4; aged 82.

Anderson, Frederick W., Atlanta, Ga.; Atlanta Southern Dental College, 1919; died December 25; aged 55.

Anderson, Paul M., Chicago; College of Dentistry, University of Iowa, 1914; died November 27; aged 58.

Arnold, Thomas W., Butler, Mo.; Western Dental College, 1897; died December 8; aged 79.

Bacon, William T., Booneville, Ark.; Southern Dental College, 1909; died December 10; aged 70.

Bagby, Burton, Mounds, Ill.; Louisville College of Dentistry of Centre College, 1915; died December 9; aged 77.

Baptist, Joseph F., Oakland, Calif.; College of Dentistry, Creighton University, 1909; died December 17; aged 64.

Beatie, Robert B., Oregon City, Ore.; died November 16; aged 89.

Bell, Joseph B., Windber, Pa.; College of Dentistry, Ohio State University, 1903; died November 16; aged 72.

Bieber, Louis E., New York; College of Dentistry, New York University, 1906; died December 20; aged 63.

Bigelow, Charles S., Evanston, Ill.; Chicago College of Dental Surgery, 1891; died January 12; aged 84.

Biron, Herbert F., Pittsfield, N. H.; School of Dentistry, Georgetown University, 1916; died December 31; aged 55.

Black, Harley W., Syracuse, N. Y.; School of Dentistry, University of Buffalo, 1909; died November 16; aged 64.

Bliss, Gertrude R., Hollywood, Calif.; Dental School, Northwestern University, 1902; died December 24; aged 79.

Bockey, Forest V., Carmel, Calif.; School of Dentistry, Georgetown University, 1917; died September 27.

Bowden, George L., Alexandria, La.; Dental School, Northwestern University, 1911; died November 28; aged 62.

Boyer, George W., La Cygne, Kan.; Western Dental College, 1902; died November 17; aged 79.

Bratt, Clarence R., Chicago; Chicago College of Dental Surgery, 1928; died October 24; aged 50.

Brown, Jesse J., Macon, Mo.; died December 6; aged 84.

Brown, Thomas A., Hastings, Minn.; College of Dentistry, University of Minnesota, 1905; died December 6; aged 68.

Butler, Maurice J., Independence, Ore.; School of Dentistry, North Pacific College of Oregon, 1915; died December 3; aged 57.

Campbell, Carl V., Columbus, Neb.; Omaha Dental College, 1905; died December 2; aged 74.

Carlson, Elmer E., Blue Island, Ill.; Chicago College of Dental Surgery, 1925; died December 16; aged 47.

Christy, Ralph L., Denver; Kansas City Dental College, 1910; died December 8; aged 60.

Clark, Joe H., Salem, Mo.; died December 8; aged 82.

Cody, John F., Brooklyn; School of Dentistry, Georgetown University, 1936; died November 29; aged 38.

Collins, Martin L., New York; School of Dentistry, New York University, 1892; died December 26; aged 81.

Copes, John B., Philadelphia; died December 3.

Copper, Luther S., West Palm Beach, Fla.; died November 10; aged 94.

Davis, Harold W., Middletown, Conn.; School of Dentistry, University of Pennsylvania, 1908; died January 6; aged 64.

Davis, Louis E., Forth Smith, Ark.; National Medical University, 1908; died November 10; aged 69.

Deaner, J. J., Tulsa, Okla.; died December 5; aged 69.

Dettner, Robert W., Palo Alto, Calif.; College of Dentistry, University of California, 1930; died December 4; aged 52.

Dickey, James H., Decatur, Ill.; Dental School, Northwestern University, 1914; died November 30; aged 76.

Dinwiddie, John A., Lowell, Ind.; Dental School, Northwestern University, 1896; died December 17; aged 77.

Eck, Walter E., Warsaw, N. Y; College of Dentistry, New York University, 1921; died November 28; aged 50.

Evans, John J., Pittsburgh; School of Dentistry, University of Pittsburgh, 1903; died December 12.

Everett, Harlan L., Kansas City, Mo.; Kansas City Dental College, 1908; died November 29; aged 63.

GaNun, Gordon M., New York; Baltimore College of Dental Surgery, 1917; died December 31.

Genis, Nathan, Jersey City, N. J.; College of Dental and Oral Surgery of New York, 1923; died December 15; aged 50.

Goodwin, Nelson J., Jr., Hartford, Conn.; died December 7; aged 66.

Graham, George D., Brooklyn; College of Dentistry, University of Iowa, 1907; died December 8; aged 68.

Graves, Charles H., Fullerton, Neb.; College of Dentistry, Creighton University, 1939; died November 29; aged 37.

Greenwood, George T., Fitchburg, Mass.; Dental School, Harvard University, 1897; died November 28; aged 77.

Hagerty, Albert L., Tipp City, Ohio; College of Dentistry, Ohio State University, 1900; died December 9; aged 81.

Hahn, Edward J., Louisville, Ky.; School of Dentistry, University of Louisville, 1933; died November 25; aged 43.

Hammond, Felix G., English, Ind.; School of Dentistry, University of Louisville, 1903; died December 16; aged 72.

Herman, L. Lawrence, Long Beach, N. Y.; died September 20; aged 55.

Holbrook, Malcolm H., Sioux Falls, S. D.; Chicago College of Dental Surgery, 1902; died November 24; aged 75.

Hubbard, Rolla M., Indianapolis; School of Dentistry, Indiana University, 1909; died December 3; aged 70.

Inglis, Cornelia B., Swarthmore, Pa.; died December 29; aged 86.

Ivory, William A., Syracuse, N. Y.; died November 11; aged 93.

Jackson, John S., Jr., Denver; School of Dentistry, University of Denver, 1924; died December 10; aged 48.

Jefferson, Ebenezer B., Nashville, Tenn.; Dental Department, Meharry Medical College, 1897; died November 14; aged 78.

Johnson, Patrick, Jacksonville, Fla.; died October 7; aged 72.

Kesel, Otto, Enon Valley, Pa.; School of Dentistry, University of Pittsburgh, 1918; died November 17; aged 58.

LaPorte, Richard C., Chicago; Chicago College of Dental Surgery, 1927; died December 30; aged 50.

Love, Hubert B., Corsicana, Texas; School of Dentistry, Vanderbilt University, 1918; died November 26; aged 54.

Love, James F., De Ridder, La.; New Orleans College of Dentistry, 1907; died November 27; aged 70.

Magruder, George R., Sidney, Mont.; College of Dentistry, University of Iowa, 1904; died November 25; aged 67.

Mains, LeRoy M., Seymour, Ind.; School of Dentistry, Indiana University, 1895; died November 25; aged 77.

Mathias, John J., Scranton, Pa.; School of Dentistry, Temple University, 1897; died November 20; aged 80.

McBride, Lyman A., Tooele, Utah; Dental School, Northwestern University, 1910; died December 8; aged 71.

McCracken, William J., Oakland, Calif.; College of Dentistry, University of California, 1902; died December 3; aged 71.

McGee, Luther C., Ponca City, Okla.; Kansas City-Western Dental College, 1929; died November 22; aged 41.

McPherson, Charles W., Medford, Mass.; Dental School, Harvard University, 1900; died November 16; aged 72.

Meeks, Charles A., Farmland, Ind.; Indiana Dental College, 1909; died November 18; aged 69.

Monson, Guy E., Ovid, Colo.; Colorado College of Dental Surgery, 1919; died December 2; aged 67.

Muzzy, Leo B., Odell, Ill.; Chicago College of Dental Surgery, 1913; died December 21; aged 58.

Nichols, Raymond E., Chicago; died November 15; aged 48.

O'Connor, Charles F., Chicago; American College of Dental Surgery, 1895; died October 20.

O'Rourke, James P., Philadelphia; Pennsylvania College of Dental Surgery, 1904; died November 19; aged 69.

Payne, George T., Brodhead, Ky.; died December 3; aged 58.

Peck, Gordon C., Glens Falls, N. Y.; School of Dentistry, University of Pennsylvania, 1916; died December 23; aged 56.

Peterson, Herman A., Waukon, Iowa; College of Dentistry, University of Iowa, 1910; died November 22; aged 62.

Polin, Oscar M., San Luis Obispo, Calif.; Dental School, Northwestern University, 1902; died October 16; aged 71.

Pollock, William A., Chicago; Dental School, Northwestern University, 1916; died December 9; aged 56.

Porter, George W., Dansville, N. Y.; School of Dentistry, University of Pennsylvania, 1924; died July 22; aged 47.

Powell, Louis, Philadelphia; Medico-Chirurgical College of Philadelphia, 1913; died September 21; aged 58.

Powers, Richard P., Cleveland; Dental School, Tufts College, 1918; died October 19; aged 52.

Rambo, Samuel D., Jr., Miami, Fla.; Atlanta Southern Dental College, 1924; died October 31; aged 54.

Rapp, Jerome A., Cape Girardeau, Mo.; School of Dentistry, St. Louis University, 1917; died November 13; aged 54.

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ANNOUNCEMENTS

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama	May 1-3	Biloxi, Miss.	G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Arizona	April 20-22	Grand Canyon	H. G. DeWolf	Valley National Bank Bldg. Tucson
Arkansas	April 2-5	Little Rock	D. M. Hamm	White Bldg., Clarksville
California	April 24-26	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California	April 3-5	Los Angeles	M. E. Ralston	Medico-Dental Bldg., Pomona
Colorado	Oct. 4-7	Colorado Springs	R. A. Downs	724 Republic Bldg., Denver 2
Connecticut	May 22-24	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			L. Kreshtool	815 West St., Wilmington
D. of Columbia	Mar. 12-15	Washington	K. H. Wood	202-1833 Eye St., N. W. Washington
Florida	Nov. 19-22	Hollywood	L. M. Schulstad	Professional Bldg., Bradenton
Georgia		Atlanta	J. M. Heard, Jr.	Persons Bldg., Macon
Hawaii	Oct. 12-14	Honolulu	J. H. Dawe	P. O. Box 39, Honolulu 10
Idaho	June 26-28	McCall	A. R. Cutler	Eastman Bldg., Boise
Illinois	May 8-11	Springfield	P. W. Clopper	623 Jefferson Bldg., Peoria2
Indiana	May 15-17	Indianapolis	E. E. Ewbank	Kingman
Iowa	May 1-3	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 7-10	Kansas City, Mo.	F. A. Richmond	Brotherhood Bldg., Kansas City
Kentucky	Mar. 29-31	Louisville	A. B. Coxwell	1976 Douglass Blvd., Louisville
Louisiana	April 13-15	Monroe	J. S. Bernhard	407 Medical Arts Bldg., Shreveport
Maine	June 22-24	Belgrade Lakes	F. P. Gilley	31 Central St., Bangor
Maryland	May 1-3	Baltimore	E. L. Pessagno, Jr.	415 Medical Arts Bldg., Baltimore 1
Massachusetts	May 1-4	Boston	A. M. Bommer	349 Broadway, Revere
Michigan	April 24-26	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota			C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi	June 18-21	Biloxi	F. C. Sneed	Oayka
Missouri	May 7-10	Kansas City	R. R. Rhoades	201 Merchants Bank Bldg., Jefferson City
Montana	May 4-7	Helena	C. S. Renouard	304 Phoenix Bldg., Butte
Nebraska	May 8-10	Omaha	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada	May 8-9	Las Vegas	C. A. Paice	Boggs Bldg., Las Vegas
New Hampshire	June 18-20	Bretton Woods	F. E. Williams	814 Elm St., Manchester
New Jersey	April 26-28	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 22-24	Albuquerque	J. S. Eilar	First National Bank Bldg., Albuquerque
New York	June 5-8	New York	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 18-20	Pinehurst	R. F. Hunt	Rose Drug Co. Bldg., Rocky Mount
North Dakota	May 7-10	Fargo	A. L. Smeby	Northwood
Ohio	Nov. 27-29	Cincinnati	E. G. Jones	185 E. State St., Columbus
Oklahoma	April 16-19	Tulsa	F. H. Binkley	Hennessey
Oregon	Mar. 6-8	Portland	H. C. Fixott, Jr.	Medical Dental Bldg., Portland
Panama Canal Zone			L. F. Baranowski	P. O. Box 102, Ft. Kobbe
Pennsylvania	Oct. 28	Atlantic City, N. J.	M. D. Zimmerman	Warren Clinic Bldg., Pottsville
Puerto Rico			J. F. Suarez	Box 3862, Santurce
Rhode Island			J. F. Colgan	838 Newport Ave., Pawtucket
South Carolina	May 7-9	Columbia	J. R. Owings	201 E. North St., Greenville
South Dakota	May 14-16	Huron	E. W. Elmen	Sioux Falls
Tennessee	May 10-12	Chattanooga	E. J. Justis	Exchange Bldg., Memphis
Texas	April 23-27	Dallas	W. Ogle	310 N. Ervay St., Dallas
Utah	May 15-17	Salt Lake City	B. F. McBride	Medical Arts Bldg., Salt Lake City
Vermont	May 22-24	Woodstock	J. A. Larrow	Middlebury
Virginia	April 17-19	Roanoke	J. E. John	804 Medical Arts Bldg., Roanoke
Washington	May 22-24	Spokane	F. J. Dingler	1502 Medical-Dental Bldg., Seattle 1
West Virginia	May 15-17	Huntington	A. B. Drake	Huntington
Wisconsin	April 11-13	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming	June 22-24	Cheyenne	T. A. Ward	326 Wyoming National Bank Bldg., Casper

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State	Date	Place	Secretary	Address
Alabama			M. D. Edwards	120 Adams, Montgomery
Arizona			R. K. Trueblood	25 N. Second Ave., Glendale
Arkansas	June 19-22*	Little Rock	H. E. Hanna	Wilson Bldg., El Dorado
California	June 12	Los Angeles	K. I. Nesbitt	507 Polk St.,
	July 24	San Francisco		San Francisco 2
Colorado	June 19-23	Denver	W. D. McCarthy	724 Republic Bldg., Denver 2
Connecticut			C. G. Brooks Recorder	302 State St., New London
Delaware	June 14-16	Wilmington	P. K. Musselman	143 W. Main St., Newark
D. of Columbia	June 5-9	Washington	J. R. Palkin	1835 Eye St., N. W., Washington
Florida	July 10-15*	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia			R. C. Coleman	State Capitol Bldg., Atlanta 3
Hawaii			H. L. Houvener	7-8 Pantheon Bldg., Honolulu
Idaho	Aug. 1	Boise	F. L. Luce	510 First National Bank Bldg., Boise
Illinois	June 27-30	Chicago	W. A. McKee	503 Wood Bldg., Benton
Indiana	June 13-16*	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Iowa	June 5-9	Iowa City	H. M. Willits	719 Roshek Bldg., Dubuque
Kansas	June 7-8, 11-12	Kansas City Mo.	G. L. Teall	Hiawatha
Kentucky	June 19-22	Louisville	R. I. Todd	Western Union Bldg., Richmond
Louisiana		New Orleans	A. R. deNux	Marksville
Maine			R. A. Derbyshire	Box 387, Skowhegan
Maryland			W. D. Day	3811 Hadley Square E., Baltimore 18
Massachusetts	June 19-23		J. C. Wilson	413 N. State House, Boston 33
Michigan	June 11-17	Ann Arbor	J. L. Champagne	3714 W. McNichols Road, Detroit 21
Minnesota	June 12-16	Minneapolis	F. A. Larson	1632 Washington St., N. E., Minneapolis
Mississippi	June 26-28	Jackson	J. C. Boswell	508 Lamar Bldg., Jackson
Missouri	June 5-6-9-10	Kansas City, Mo.	R. R. Rhoades	Central Trust Bldg.,
	June 7-10	St. Louis		Jefferson City
Montana	July 10-13	Helena	T. C. Betzner	301 Power Bldg., Helena
Nebraska			C. A. Bumstead	924 Stewart Bldg., Lincoln
Nevada	June 5, Dec. 4	Reno	G. C. Steinmiller	Masonic Temple, Reno
New Hampshire	June 29-30		J. B. Brown	5 N. State St., Concord
New Jersey	June 5-9†		W. A. Wilson	150 E. State St., Trenton 8
	June 5-6‡			
New Mexico	June 26-29	Santa Fe	J. J. Clarke, Sr.	Artesia
New York	June 23-24 and Sept. 29-30‡†	New York and Buffalo	D. W. Beier	23 S. Pearl St., Albany 7
	June 27-30 and Oct. 3-6**†	New York Buffalo Syracuse and Albany		
	June 24‡‡	New York Rochester and Buffalo		
	Sept. 30‡‡	New York and Buffalo		
	June 27-28 and Oct. 3-4**‡	New York and Buffalo		
North Carolina	June 26	Raleigh	F. O. Alford	1109 Liberty Life Bldg., Charlotte 2
North Dakota	July 9-13*	Fargo	W. J. Ford	Fargo
Ohio	June 26-July 1	Columbus	E. D. Lowry	79 E. State St., Columbus
Oklahoma	June 12-14	Oklahoma City	N. D. Griffith	509 Medical Arts Bldg., Oklahoma City 2
Oregon	June 19-22*	Portland	A. F. Davis, Exec. Secy.	306 Public Service Bldg., Portland
Pennsylvania	June 19-24†	Philadelphia and	R. E. V. Miller	Northampton National
	June 19-22‡	Pittsburgh		Bank Bldg., Easton.
Rhode Island	May 10††	Providence	F. M. Hackett	State Office Bldg., Providence
South Carolina	July 6-8	Columbia	E. G. Bumgardner	1517 Hampton St., Columbia
South Dakota			R. W. Ellis	Salem

Tennessee	June 12-15	Memphis	F. S. Maxey	804 Bennie Dillon Bldg., Nashville 3
Texas	June 18-23	Dallas	R. T. Weber	312 Capital National Bank Bldg., Austin
Utah	June 26		J. J. Dalpiaz	Helper
Vermont	June 26-28	Montpelier	F. A. Reid	Windsor
Virginia	June 13	Richmond	J. M. Hughes	715 Medical Arts Bldg., Richmond 19
Washington			J. B. Kiefer, Jr.	510 Cobb Bldg., Seattle
West Virginia	June 26-28	West Liberty	C. R. Singleton	535 Medical Arts Bldg., Charleston 1
Wisconsin	June 12-16	Milwaukee	S. F. Donovan	Tomah
Wyoming	June 19-21	Cheyenne	W. J. Ryan	208 Boyd Bldg., Cheyenne

*Dentistry and dental hygiene.
†Dentistry.
‡Dental Hygiene.
§Practical examinations.
**Written examinations.
††Basic sciences examinations.

OTHER MEETINGS

Name	Date	City	Secy. or Chm.	Address
Academy of Denture Prosthetics	May 1-7	Milwaukee	I. L. Furnas Secy.	La Jolla, Calif.
American Association of Dental Schools	Mar. 27-31†	French Lick Springs, Ind.	J. E. Buhler Secy.	School of Dentistry, Emory University, Atlanta 3, Ga.
American Association of Orthodontists, Forty-Sixth Annual Session	May 8-11	Chicago	G. R. Moore Secy.	919 Oakland Ave., Ann Arbor, Mich.
American Board of Oral Surgery	April 2-3	Chicago	L. M. FitzGerald Secy.	718 Roshek Bldg. Dubuque, Iowa
American Board of Orthodontics	May 4-7	Chicago	S. C. Hopkins Secy.	1726 Eye St., N. W., Washington, D. C.
American Dental Association Ninety-First Annual Session	Oct. 30-Nov. 1	Atlantic City, N. J.	H. Hillenbrand Secy.	222 E. Superior St., Chicago
American Dental Society of Europe	July 19-22	Amsterdam, Holland	F. D. Derrick	140 Park Lane, London, W. 1.
American Public Health Association, Southern Branch, Dental Section	April 27-29	Birmingham, Ala.	P. Ayers Secy.	1912 Eighth Ave., S., Birmingham, Ala.
American Society for the Advancement of General Anesthesia in Dentistry, Spring Meeting	Mar. 27	New York	M. H. Feldman Exec. Secy.	730 Fifth Ave., New York 19
Detroit District Dental Society, Ninth Annual Dental Review	Oct. 11-12	Detroit	W. S. Anderson Chm.	4421 Woodward Ave., Detroit 1
District of Columbia Dental Society, Annual Postgraduate Clinic	Mar. 12-15	Washington	A. A. Shapiro Promotion Chm.	1835 Eye St., N. W., Washington, D. C.
International Association for Dental Research	Mar. 24-26	French Lick, Ind.	E. H. Hatton Secy.	311 E. Chicago Ave., Chicago
Italian Medico-Dental Association, Twenty-Fifth Annual Convention on Stomatology	Sept. 26-30	Stresa (Lake Maggiore)	Enrico Goia	Via Lamarmora, 9, Torino, Italy
Kansas and Missouri Dental Assistants, Examinations for Certification Course	May 7	Kansas City, Mo.	O. Ioerger Secy.	215 E. Lincoln, Wichita, Kan.
National Board of Dental Examiners	April 10-11‡		G. L. Teall Secy.	Box 71 Hiawatha, Kan.
New England Dental Society, Annual Meeting	Oct. 4-5	Boston	A. R. Wilson Secy.	43 Farmington Ave., Hartford, Conn.
New York University College of Dentistry, Silver Anniversary	April 14	New York	Sidney Sorrin Chm.	New York University Alumni Office 22 Washington Square, North, New York 11

Northeastern Society of Orthodontists, Annual Meeting	Mar. 6-7 Nov. 6-7	Boston Washington, D. C.	O. Jacobson Secy.	35 W. 81st St., New York
Sigma Epsilon Delta Fraternity, Annual Convention	April 29-30	Philadelphia	M. Kelner	1930 Chestnut St., Philadelphia 3
Southeastern Society of Oral Surgeons, First Annual Meeting	Mar. 17-18	Atlanta, Ga.	G. W. Matthews Editor	1922 Tenth Ave., S. Birmingham, Ala.
State of New York, Dental Assistants Association, Twenty-Fifth Annual Meeting	June 6-8	New York	S. Danenbaum Chm. Publicity	700 W. 175th St., New York 33
Temple Dental Alumni, Annual Meeting	May 9-10	Philadelphia	A. L. Borish	255 S. 17th St., Philadelphia 3
Thomas P. Hinman Mid-Winter Clinic, Thirty-Eighth Annual Meeting	Mar. 19-22	Atlanta, Ga.	S. L. Davis Gen. Chm.	932 Candler Bldg., Atlanta, Ga.
Tufts College Dental School, First Annual Berkshire Conference in Periodontology	June 13-17	Eastover, Lenox, Mass.		Berkshire Conference Tufts College Dental School, 136 Harrison Ave., Boston
University of Kansas City, School of Dentistry, Kansas City-Western Dental College, Alumni Annual Meeting	Mar. 20, 21	Kansas City, Mo.	H. H. Dukes Chm. Publicity Committee	New Brotherhood Bldg., Kansas City, Kan.
University of Pennsylvania, Dental Alumni, Annual Meeting	June 15-17		J. P. Looby Chm. Publicity Committee	The Thomas W. Evans Museum and Dental Institute, School of Dentistry, University of Pennsylvania, Philadelphia 4
University of Pennsylvania, School of Dentistry, Second Mid-Atlantic States Seminar in Oral Medicine	Nov. 5-10	Skytop, Pa.	L. W. Burket Director Postgraduate Courses	School of Dentistry, University of Pennsylvania, 4001 Spruce St., Philadelphia 4
University of Toronto, Faculty of Dentistry, Continuation Course in Nutrition as Applied to the Practice of Dentistry	May 18-20	Toronto	R. G. Ellis Dean	Faculty of Dentistry, University of Toronto, 230 College St., Toronto, Ontario, Canada
University of Toronto, Faculty of Dentistry, Continuation Course in Oral Surgery	April 17-21	Toronto	R. G. Ellis Dean	Faculty of Dentistry, University of Toronto 230 College St., Toronto, Ontario, Canada

†General sessions March 27-29; research meetings March 29-31.
‡Part 1 and Part 2 in schools where there are five or more candidates.

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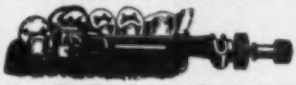

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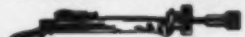

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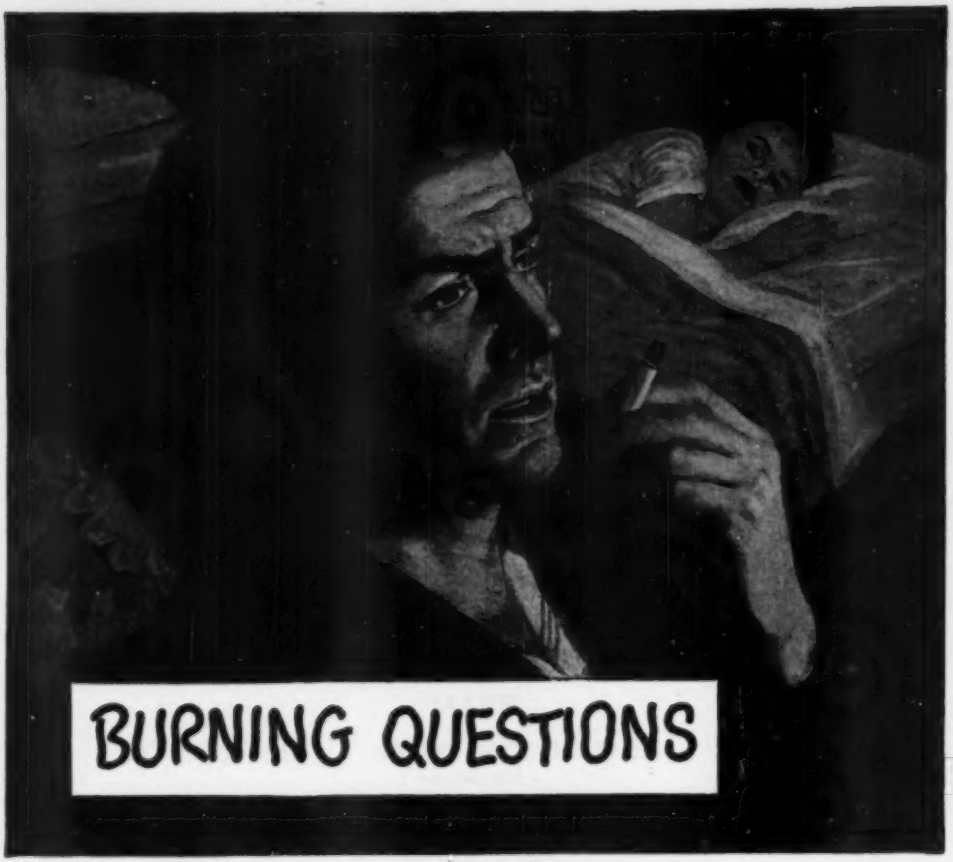

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This is number one of a series of three announcements of nutrition research.

Keeping up with Nutrition Research

New study published on human protein metabolism

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*Leverton, R. M. and Gram, M. R. *Nitrogen excretion of women related to the distribution of animal protein in the daily meals.* J. Nutrition 39:57 (Sept.) 1949.

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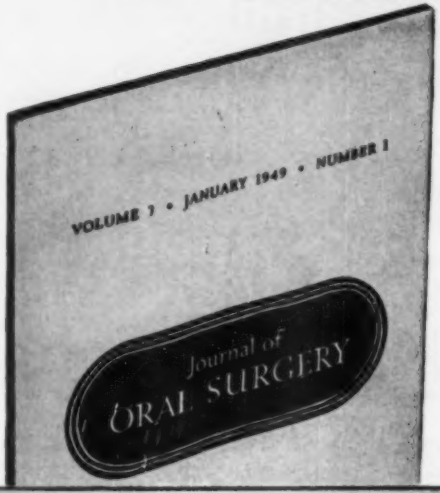

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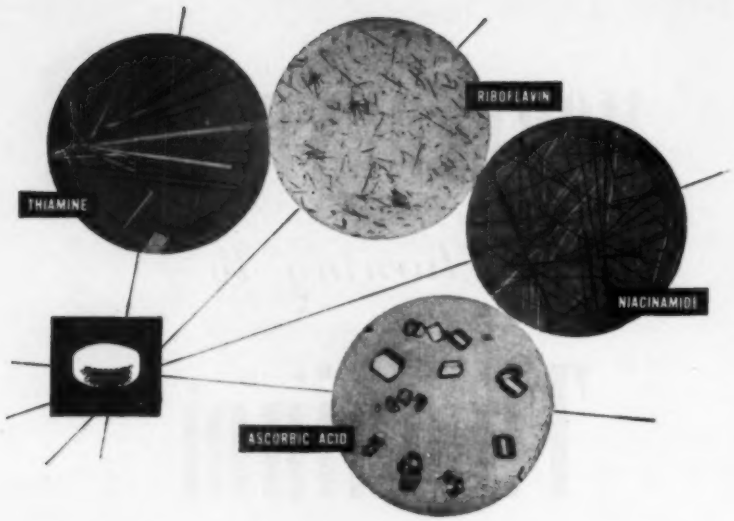

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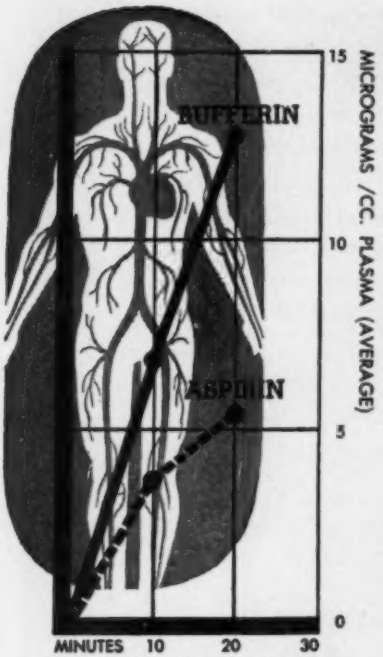

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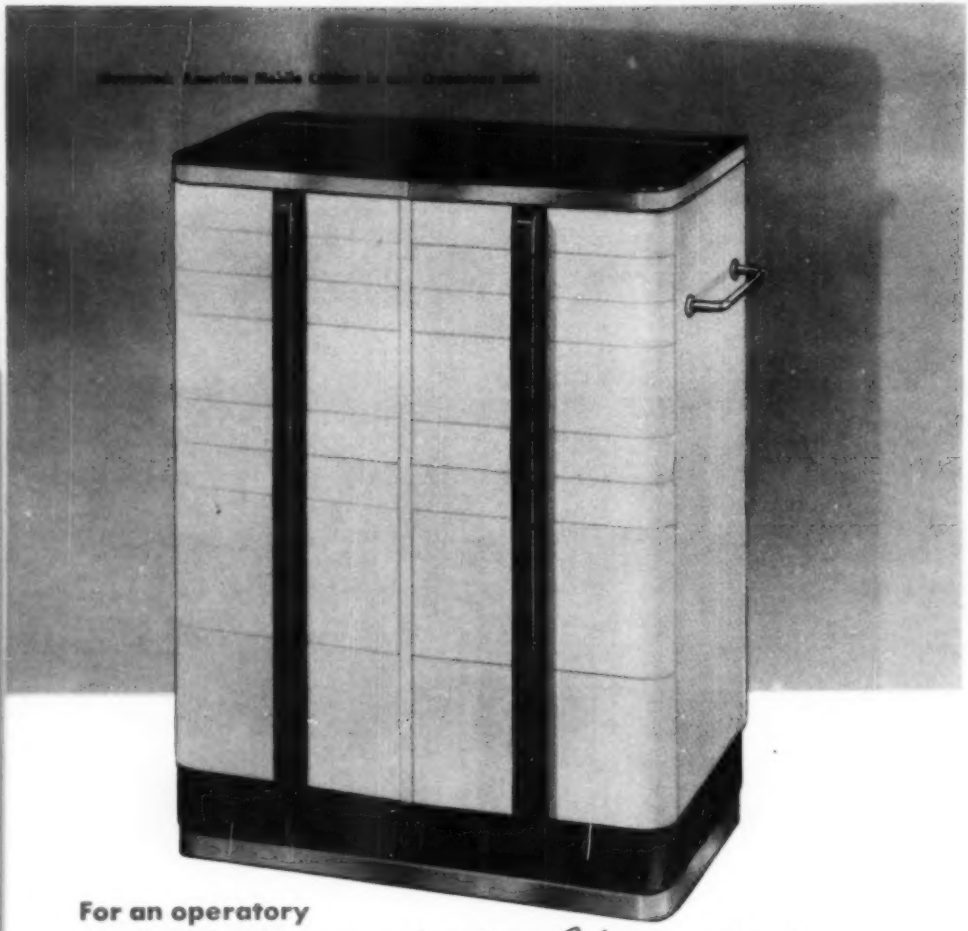

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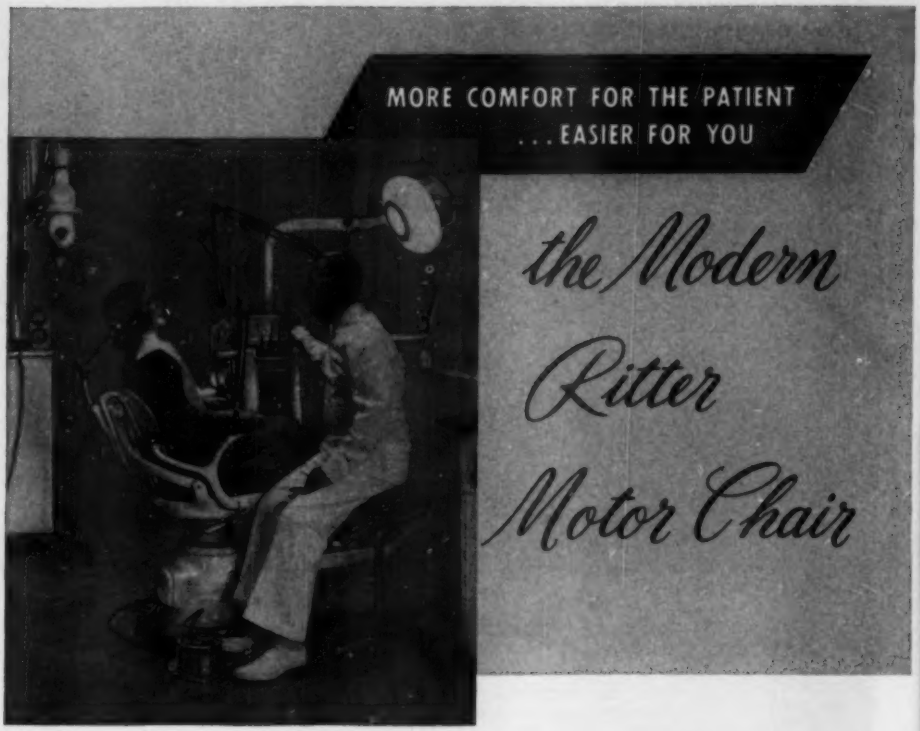

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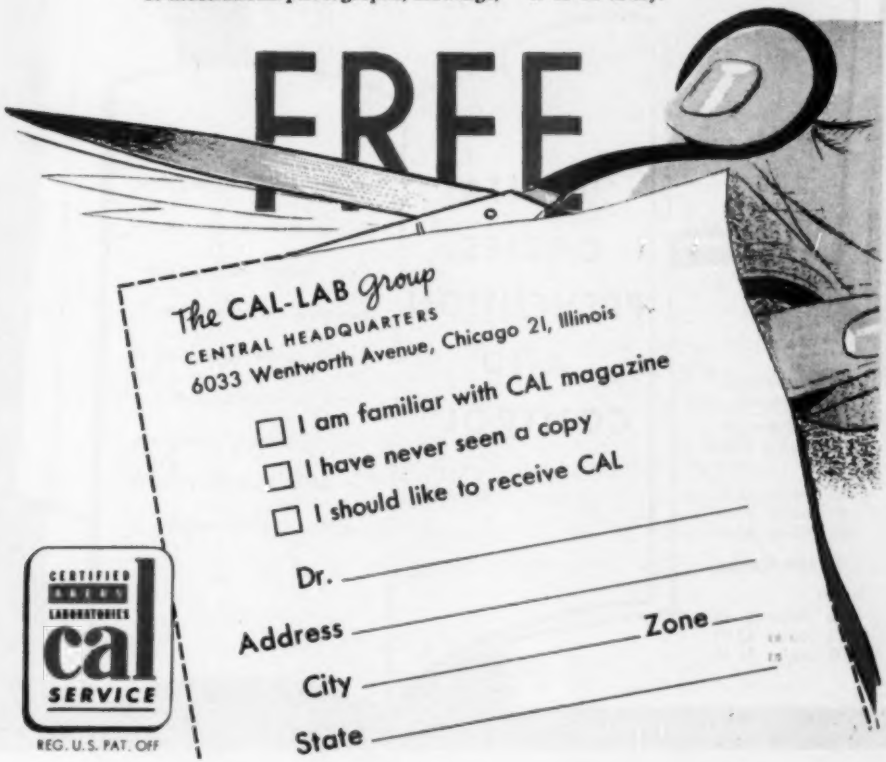

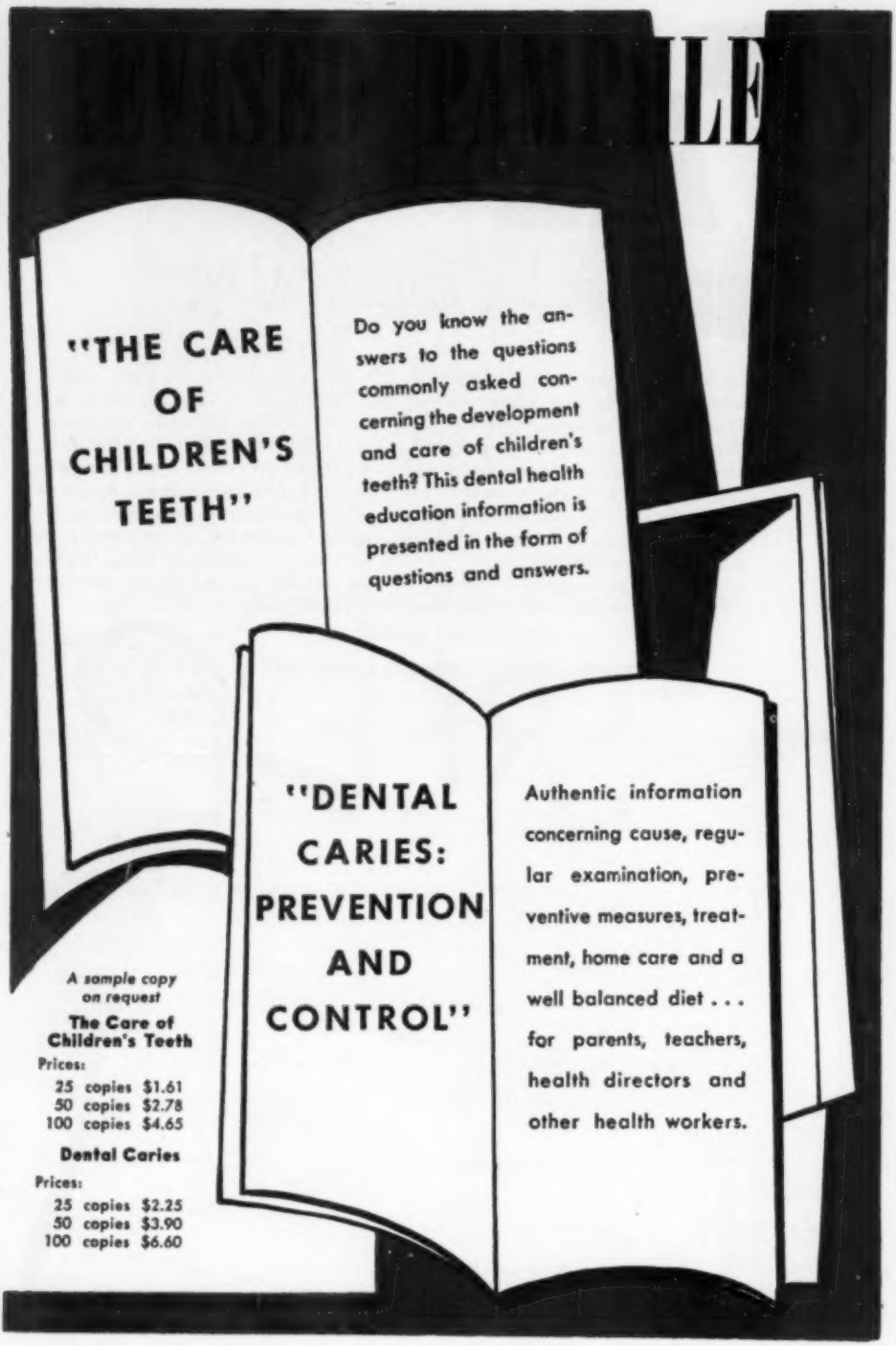
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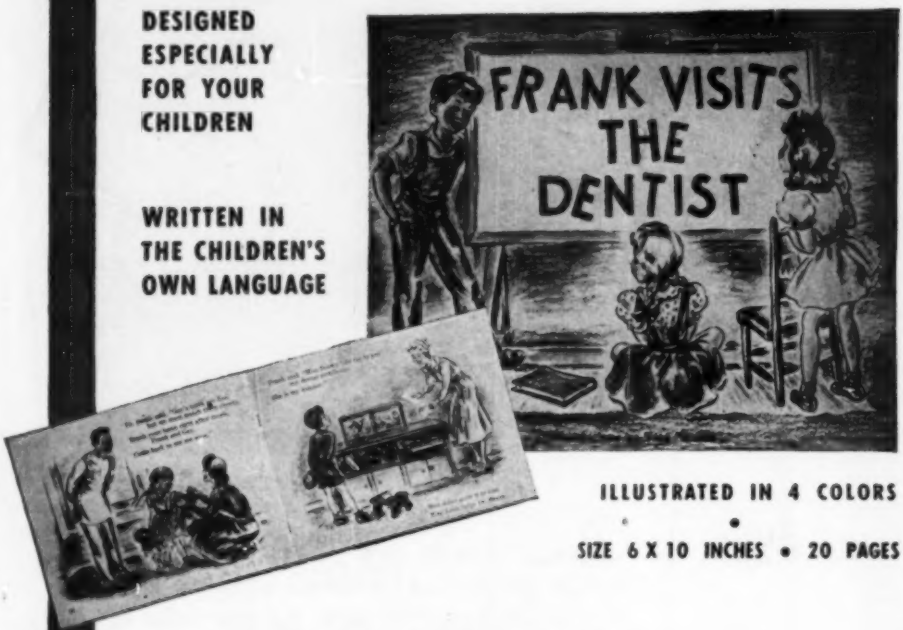

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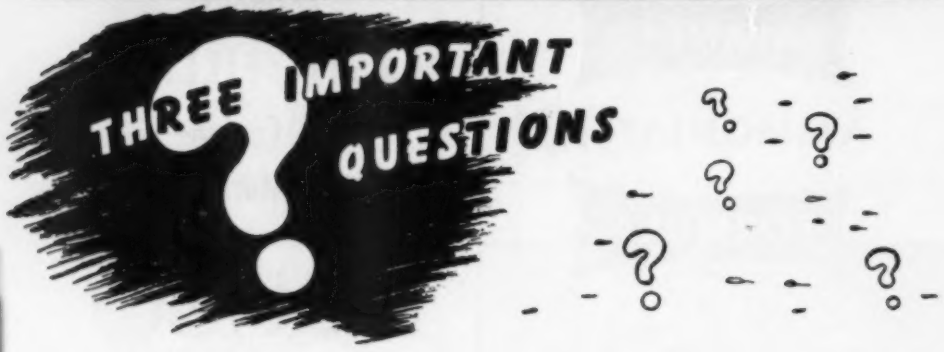

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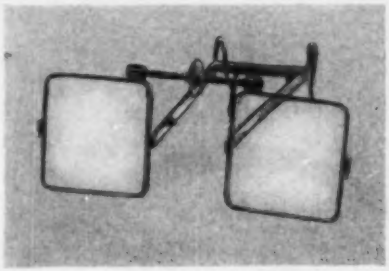

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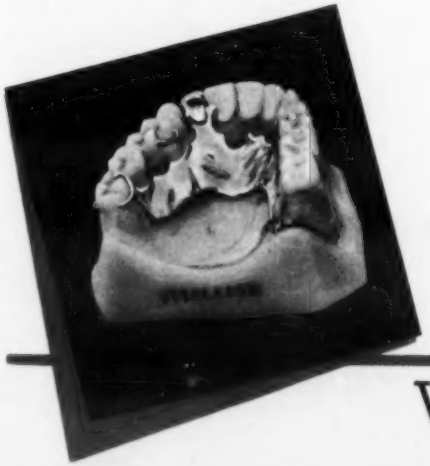

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(a) Young dentists interested in academic appointments for positions in following departments: (1) oral surgery (2) operative dentistry (3) crown and bridge (4) prosthetics).

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(b) Dentist to direct dental public health program, metropolitan department of health; West.

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(d) Dentist interested in research in all phases of oral diseases; long-range program; interest in children and research required; university medical center; Middle West.

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(e) Pedodontist or general dentist to become associated with dentist well established in Illinois.

•

(f) Dentist to become associated with dental department, industrial organization; vicinity Washington, D. C.

•

(g) Dentist to join department of dentistry, health department, public schools; Indiana.

•

(h) Senior dentist to direct city health school program; North Carolina.

•

(i) Associate; general practice; small town, short distance, large city, Indiana; partnership.

•

(j) General dentist and two pedodontists to become associated with dental department, private practice clinic and hospital; present staff consists of seven dentists; winter resort area, Southwest.

•

(k) Pedodontist to become associated with specialist long established in Florida; exceptional opportunity.

(l) Several young dentists to join department of medicine and surgery; medical center; Middle West.

•

(m) Orthodontist to become associated with orthodontist well established in Wisconsin.

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(n) Pedodontist to become associated with dentist having large general practice; town of 100,000, Middle West.

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(o) Public health dentist to direct state program of dental health education; $6600-$7800.

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(p) Associate; general practice of dentistry, town of 75,000; well equipped offices; eventual partnership; Illinois.

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(q) School dentist; mining community of southeast state; mobile unit; $6000.

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(u) Orthodontist to become associated with orthodontist long established vicinity New York City; partnership possibilities.

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(v) Dentist to direct program, public schools, university town, Southeast.

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(w) Young dentist to become associated with dentist long established in college town of 25,000; early partnership.

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•

Dentist; B.S., D.D.S., eastern schools; year, dental resident, teaching hospital; graduate training periodontia.

•

Prosthodontist; D.D.S., and M.S. in Public Health, eastern universities; year's research; six years, full time teaching, prosthetic department, university school.

•

Dentist qualified public health and children's dentistry; B.A., D.D.S., M.A., Ph.D., leading schools; year's residency, children's dentistry; teaching experience; research has been particularly concerned with administrative and educational problems in connection with children's dental program in under-developed areas.

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Oral surgeon; three-year fellowship, oral surgery; Master's degree, oral surgery, several years' successful private practice; has applied for examinations, American Board of Oral Surgery.

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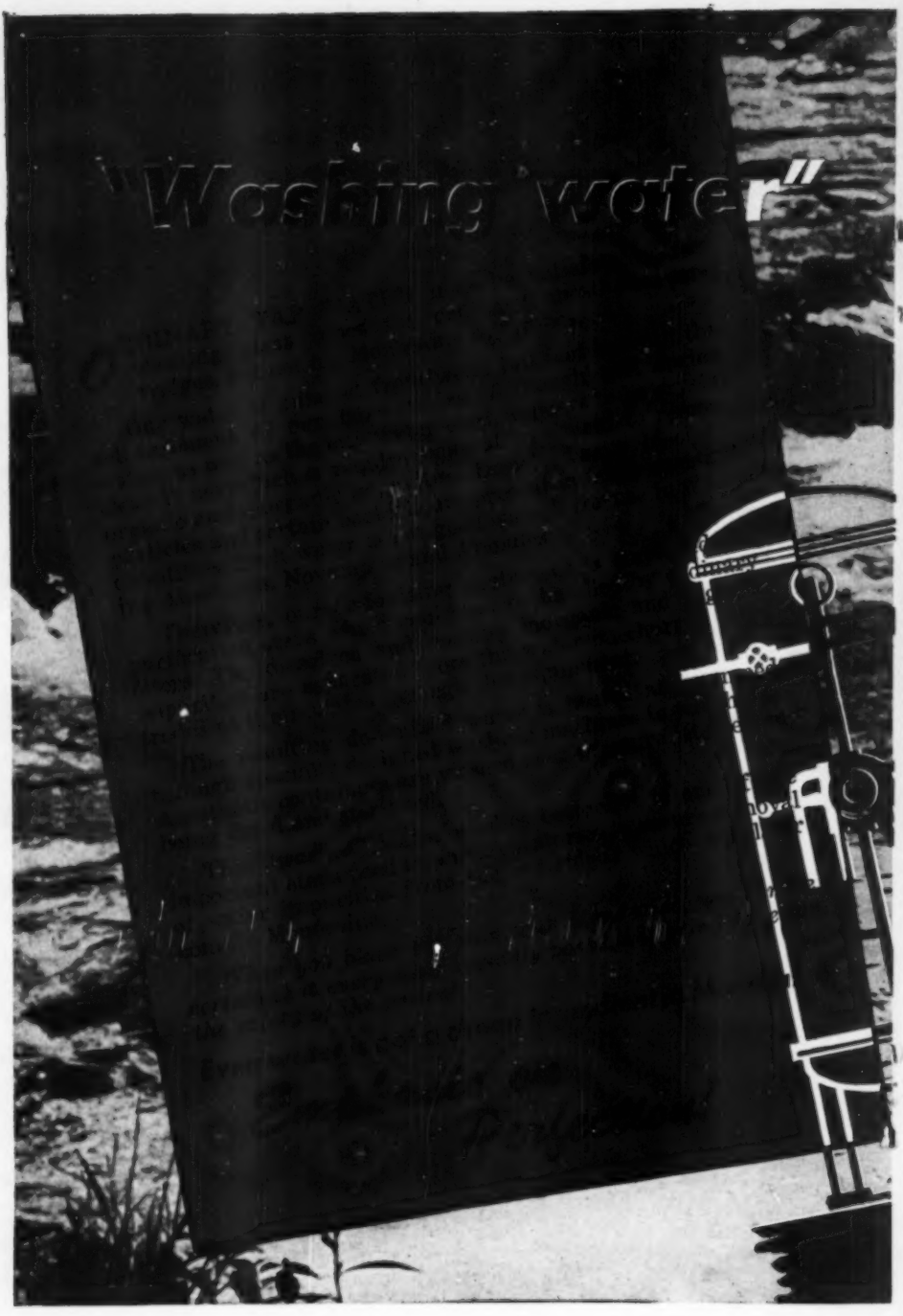
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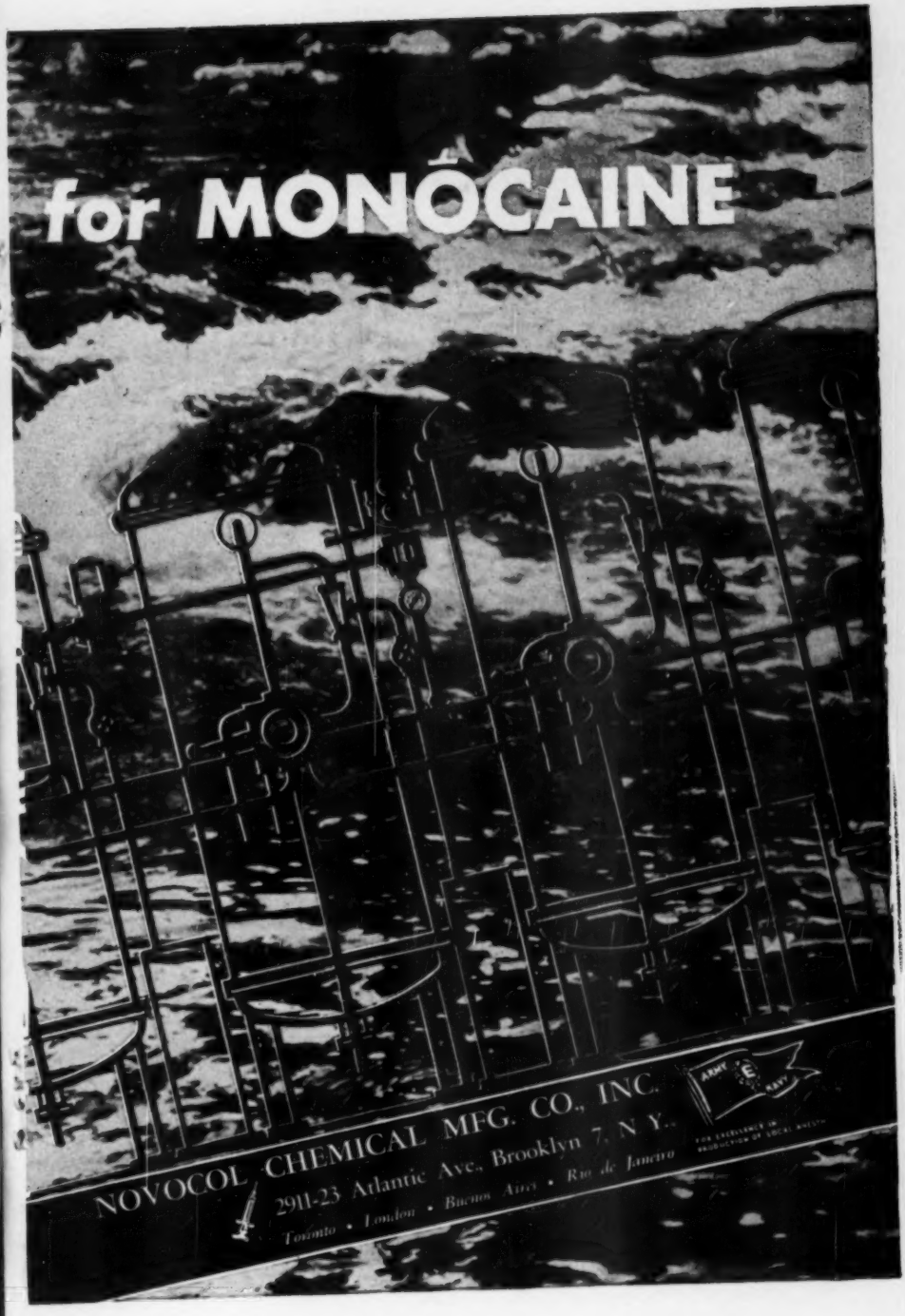
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